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February 27, 2014

Chief, Water Programs Enforcement Branch
Water Management Division
U.S. EPA Region 4
61 Forsyth Street, S.W.
Atlanta, Georgia 30303

VIA ELECTRONIC MAIL AND OVERNIGHT DELIVERY

Attention: David Phillips

Reference: Final Report
Administrative Order On Consent No. CWA-04-2008-4779
Hillsborough County, Florida

Dear Mr. Phillips:

The Hillsborough County Public Utilities Department (PUD) respectfully submits the attached Final Report demonstrating compliance with the terms of the Administrative Order On Consent (AOC). The report summarizes AOC-related activities for the period from initiation of the AOC, June 6, 2008, through December 31, 2013, and provides more detailed data for Calendar Year (CY) 2014. Since the PUD Fiscal Year (FY) does not follow the CY, summary data that is FY based rather than CY based is so noted.

The County is committed to continuing a program that minimizes and/or eliminates wastewater overflows and spills. We believe that we have made significant improvements over the past 5 years and will strive to enhance the program further. For the current FY we have doubled the effort to rehabilitate and replace portions of our gravity collection system. In addition, we are installing monitoring at our major wastewater pumping stations (250 total) to help prevent overflows due to power failures. Our goal is to protect the health and safety of our customers and certainly protect our natural resources as well.

Our previous Department Director, Mr. Paul J. Vanderploog retired in March of 2012. As the current Director, I commit to ensuring the continued implementation of the various MOM Programs and CTSERP recommendations designed to properly operate and maintain the County's collection system and further reduce SSO occurrences.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

U.S. EPA Region 4
February 27, 2014
Page Two

Please do not hesitate to contact me should you require any additional information.

Sincerely,

A handwritten signature in blue ink, appearing to read "George B. Cassady".

George B. Cassady, P.E.
Director, Hillsborough County Public Utilities Department

Attachments

cc: Ms. Elsa Potts, Program Administrator w/attachments
Wastewater Management
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399



Hillsborough County

Final Report

Dated

February 26, 2014

By

Hillsborough County Public Utilities Department

925 East Twiggs Street
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Assisted By

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- Appendix B. Wastewater and Reclaimed Water Projects Delivered FY 2008 through FY 2013
- Appendix C. Fitch Ratings September 2012 Bond Rating Upgrade
- Appendix D. Recharging Coastal Aquifers with Reclaimed Water

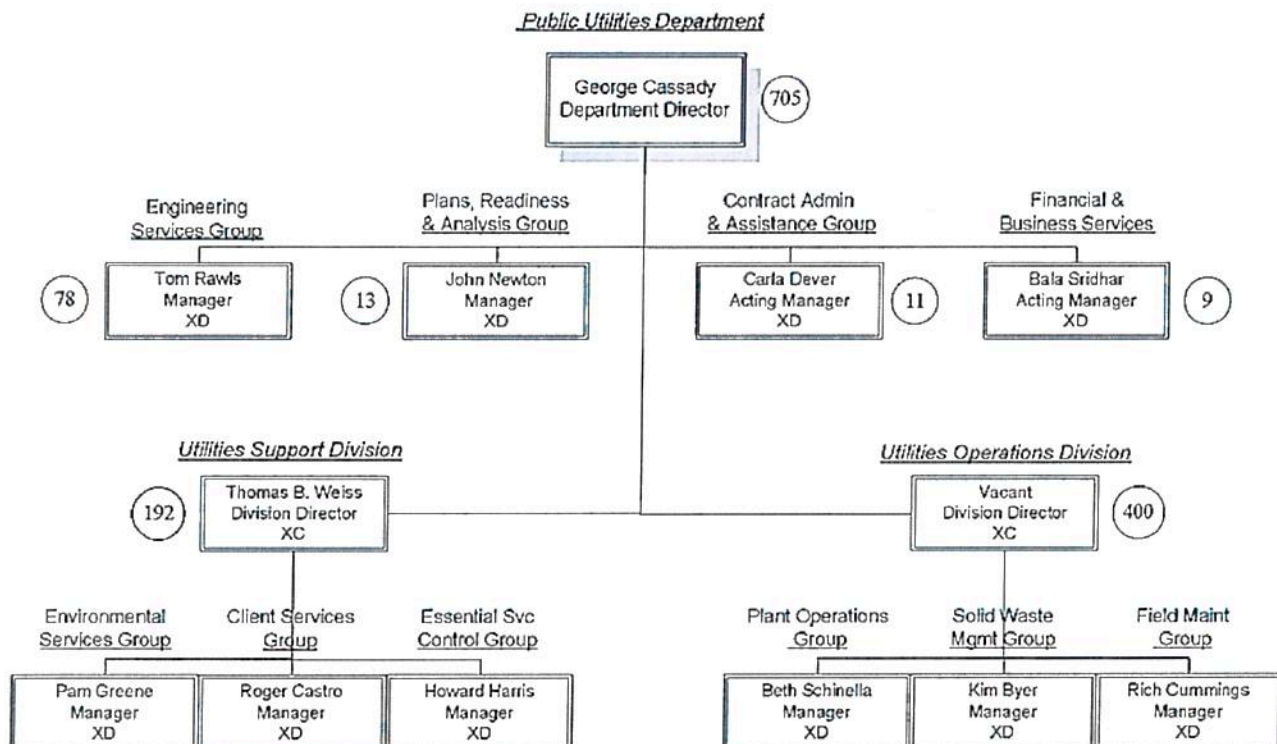
1 BACKGROUND

The Hillsborough County Water Resources Services (WRS) entered into an agreement with the U.S. Environmental Protection Agency Region 4 (EPA Region 4) to resolve allegations that WRS discharged untreated sanitary sewage to Waters of the United States and that WRS failed to properly operate the Collection and Transmission Systems. The resulting agreement is detailed in Administrative Order on Consent No. CWA-04-2008-4779 (the AOC), which had an effective date of June 6, 2008.

1.1 Organization

In 2010, subsequent to entering into the AOC, Hillsborough County embarked on a restructuring initiative that merged the WRS and the Solid Waste Departments into a single entity, the Hillsborough County Public Utilities Department (PUD). The current organizational chart is shown in Figure 1.1. Of the 705 total full-time equivalent (FTE) positions indicated in Figure 1.1, approximately 40 FTE positions, just under 6 percent, are vacant as of December 31, 2013. Approximately 75 percent of the vacancies are in the Utilities Operations Division.

Figure 1.1. Public Utilities Department Organizational Chart



Due to previous problems with filling operational staff vacancies PUD created a significant training and advancement program for plant operations personnel. Unfortunately, this led to

surrounding utilities hiring away operating staff due to the inability to compete in the compensatory marketplace (low salaries). In Fiscal Year (FY) 2013, PUD initiated significant reclassification actions adjusting operating division staff salaries resulting in becoming a more competitive presence in the market place. Vacancies are gradually being reduced since the reclassification actions were undertaken.

1.2 Collection System

PUD's collection system asset base has only seen modest changes since initiation of the AOC as shown in Table 1.1 for FY 2005 through FY 2013 for the key collection system asset categories. The annual asset changes for pipes, pump stations, low pressure sanitary sewer (LPSS) systems and LPSS force mains are also illustrated in Figure 1.2. Over the 8-year period shown, the pipes increased nearly 33 percent, although this increase is misleading because the definition of pipes changed in FY 2010 to include estimated lateral lengths for consistency with American Water Works Association (AWWA) benchmarking calculations for SSOs per 100 miles of pipe. The approximately 16 percent increase in the number of pump stations is more representative of system growth of about 2 percent per year. The number of LPSS systems increased by 10.0 percent, or an average of 1.3 percent per year, but is also impacted by a significant decrease in FY 2011 when a number of systems were eliminated by the availability of gravity sewers in the area. The new LPSS systems largely entered existing LPSS force mains, with the number of force mains increasing only 3.9 percent, or an average of 0.5 percent per year.

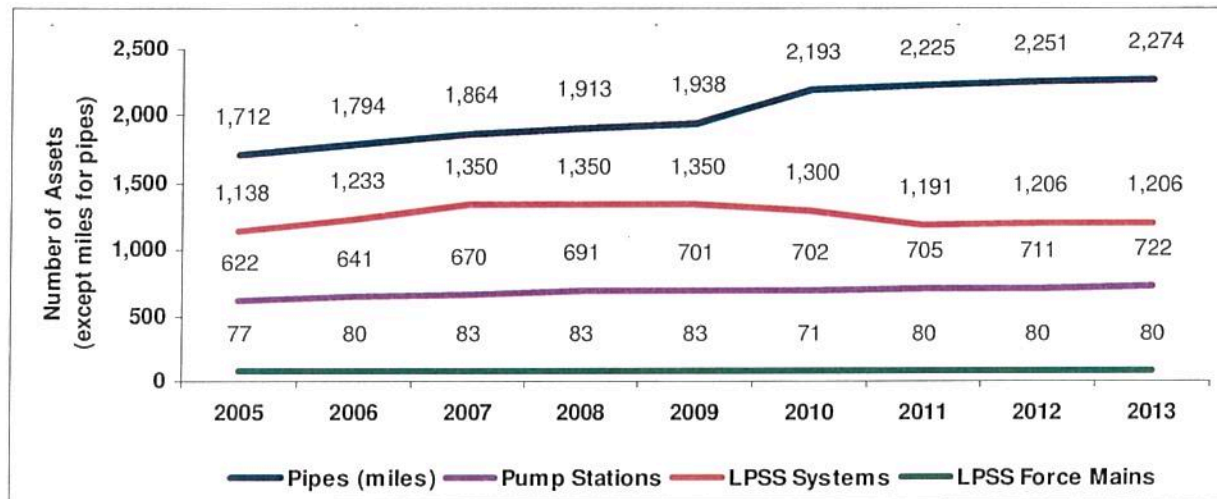
Table 1.1. Wastewater Collection System Assets by Fiscal Year

Asset Category ¹	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
Pipes (miles) ²	1,712	1,794	1,864	1,913	1,938	2,193	2,225	2,251	2,274
Air Release Valves	211	637	680	820	903	903	979	998	996
Gate/Plug Valves	2,837	2,901	3,425	4,170	4,420	4,580	4,707	4,799	4,935
Pump Stations	622	641	670	691	701	702	705	711	722
Manholes	27,764	28,360	30,000	30,840	31,130	31,180	31,365	31,605	31,911
LPSS Systems	1,138	1,233	1,350	1,350	1,350	1,300	1,191	1,206	1,252
LPSS Force Mains	77	80	83	83	83	71	80	80	80

¹ The Fiscal Year in Hillsborough County runs from October 1 through September 30, with FY13 starting October 1, 2012, and ending September 30, 2013.

² The "pipes" category includes gravity sewers and force mains, including LPSS force main mileage (the LPSS force main totals in the last row are number of LPSS force mains and not mileage totals). The FY10 and later years "pipes" category adds estimated lateral pipe lengths to allow comparison with AWWA benchmarking calculations for SSOs.

Figure 1.2. Pipe, Pump Station LPSS System and LPSS Force Main Annual Asset Totals



The modest annual average asset base changes shown in Table 1.1 and in Figure 1.2 are reflective of a lack of customer growth associated with the 2008/2009 national economic recession. For the Florida economy, which has traditionally been supported by tourism and growth, the national housing market crash caused tourism, real estate transactions and construction activity to fall sharply. Further, with most Americans experiencing reductions in their discretionary income, vacations and relocations to Florida were postponed or cancelled, sending a ripple effect through the Florida economy as well as through PUD's water and sewer system revenue receipts. The slow economic recovery is continuing to constrain PUD's ability to fund infrastructure improvements and additional corrective actions.

Specific to Hillsborough County, growth had begun to slow as early as 2007. Growth stagnated in 2008 and the number of water and sewer customers actually began to decline. In 2009, customers continued to decline as home foreclosures escalated. The County implemented severe cost controls and PUD, while not facing as steep a drop in revenues as the County was facing in tax revenues, implemented a self-imposed Reduction in Force (RIF). The RIF included 28 employees and a decision by utility management to deactivate several vacant positions. These actions saved \$2.6 million, but required a restructuring of the workforce to accommodate the reduced size. Expenses were reduced by another \$14 million mostly through bond restructuring. The County approved a modest rate indexing proposal of 1.7 percent, which was a small sum compared to the amount of lost revenue.

Despite the challenging economic and revenue situation, the County was able to achieve a bond rating upgrade by Fitch Ratings in September 2012. As described in the Fitch Ratings' summary in Appendix C, approximately \$196 million water and wastewater utility system revenue bonds were upgraded from "AA+" to "AAA." In May 2012, Moody's Investors Service reviewed and affirmed an "Aa1" rating and in June for the same bond offering. In December 2013 Standard & Poor's Rating Services also affirmed its "AA+" long-term rating. High bond ratings are needed to

obtain favorable interest rates and thus reduce the amount of revenue that must be diverted to debt payments and away from day-to-day utility operations.

1.3 Report Organization

The following sections of this report include:

- **Section 2, SSO Summary.** Summarizes sanitary sewer overflow (SSO) statistics and trends.
- **Section 3, Compliance Actions.** Reviews the current status of AOC requirements and summarizes the various corrective actions, capital improvement projects and operational enhancements implemented since initiation of the AOC.
- **Section 4, Continual Improvement Plans.** Details the ongoing utility activities to ensure continued compliance with the Clean Water Act requirements.
- **Section 5, Effectiveness Assessment.** Assesses the effectiveness of such the corrective actions completed to date in preventing SSOs and identifies areas for improvement.

Supporting documentation is contained in the following appendices:

- Appendix A, MOM Program Key Performance Measurements.
- Appendix B, Wastewater and Reclaimed Water Projects Delivered FY 2008 Through FY 2013.
- Appendix C, Fitch Ratings September 2012 Bond Rating Upgrade.
- Appendix D, Recharging Coastal Aquifers with Reclaimed Water.

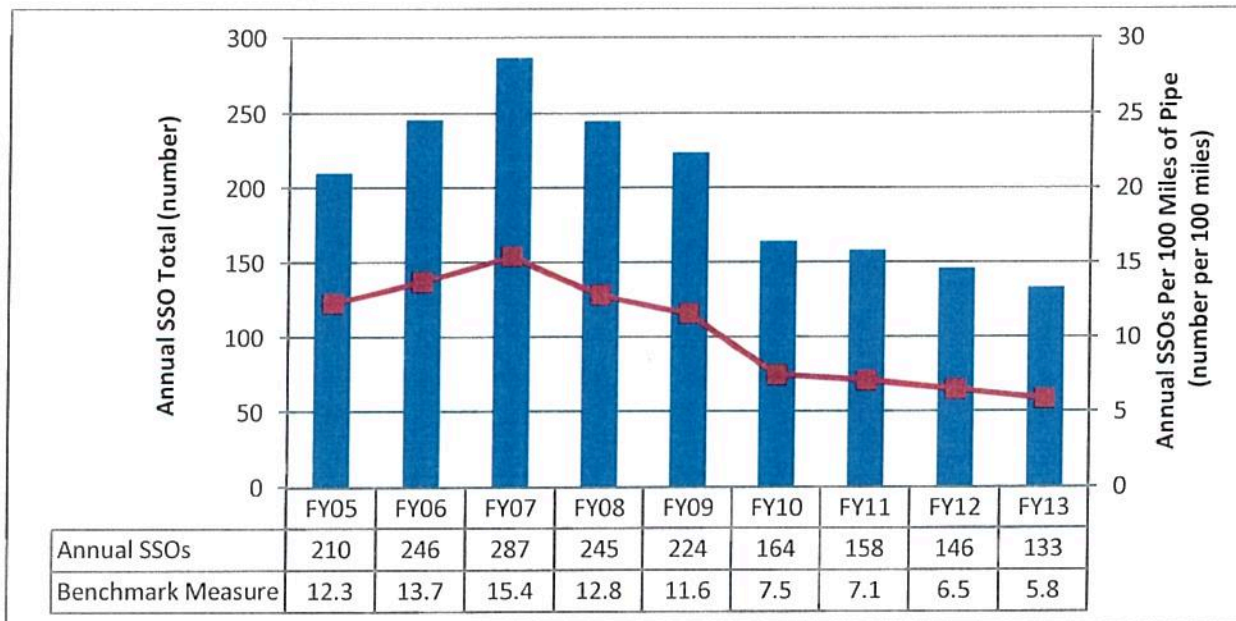
2 SSO SUMMARY

Section 2 presents the SSO data since prior to the initiation of the AOC through the end of the FY 2013 fiscal year. Section 2 concludes with a trend analysis description.

2.1 SSO Data

PUD has implemented improved SSO record keeping and tracking with the implementation of Comprehensive Asset Management System (CAMS) and Computerized Maintenance Management System (CMMS) programs and software. This section summarizes SSO statistics based on this data, as well as the trend evaluations used by PUD to further reduce the number and volume of SSOs. Figure 2.1 shows the 9-year trend for total number of SSO events for FY 2005 through FY 2013. As shown in Figure 3, the annual number of SSO events had been increasing prior to the initiation of the AOC, but has been steadily decreasing since then, with the FY 2013 total a reduction of nearly 54 percent from the FY 2007 peak.

Figure 2.1. Annual SSOs for FY 2005 through FY 2013



Since the number of SSO varies greatly between various collection systems, the analysis in Figure 2.1 also shows the annual SSOs in benchmark measure terms of annual SSOs per 100 miles of pipe. The miles of pipe used in the Figure 2.1 calculations is the sum of the "pipes" row as listed in Table 1.1. The pipes row includes both gravity pipes and force mains. Lateral pipes are included in the benchmark calculation starting in FY 2010.

PUD's FY 2013 rate of 5.8 annual SSOs per 100 miles is above the median value of 3.3 SSOs per 100 miles cited in AWWA's 2011 benchmarking survey. That 2011 survey noted 3.3 SSOs per

100 miles for wastewater-only utilities and a much lower 1.7 SSOs per 100 miles for combined water and wastewater utilities. However, these low benchmark survey numbers are suspect. First, only those utilities choosing to voluntarily participate in the survey are included in the data. This provides a “self-selection” that likely only includes high performing utilities. Second, there are a very small number of utilities in the 2011 survey data. There were 3 wastewater utilities and 49 combined utilities.

In addition to the SSO benchmarking data, AWWA includes collection system integrity benchmarking data. Collection system integrity is measured by the number of wastewater failures per 100 miles of pipe. Wastewater failures are defined as:

“ . . . a loss of capacity resulting from a flow restriction in gravity or pressurized wastewater systems. Flow restrictions may be caused by deposition of foreign materials, structural failures of pipes, appurtenances, or access holes, deterioration of collection system materials, and root intrusion. Low spots in gravity systems (sometimes called swags) are failures if there is potential for deposition and diminished sewer capacity. Electrical and mechanical lift station failures unrelated to flow restrictions, electrical power outages at lift stations, and failures that occur on customer properties are not counted as failures for the purpose of this indicator. Also excluded are any failures directly caused by the action of a person authorized by the utility, such as failure caused by incidental damage during construction/repair or incorrectly marked locations.” (AWWA, 2011 Benchmarking Performance Indicators for Water and Wastewater Utilities: Survey Data and Analyses Report.)

Based on the AWWA collection system integrity definition, PUD had a peak FY 2007 rate of 4.6 failures per 100 miles of pipe and a current FY 2013 rate of 2.9 failures per 100 miles of pipe for their wastewater collection system. PUD’s FY 2013 rate was a reduction of approximately 37 percent. The median collection system integrity in the 2011 benchmarking survey was 2.5 failures per 100 miles of pipe for wastewater-only utilities and 9.1 failures per 100 miles of pipe for combined utilities. The number of reporting utilities was 3 wastewater-only utilities and 42 combined utilities. PUD compared favorably to the benchmark failure rate despite the low number of reporting utilities.

The original AWWA benchmarking survey in 2005 had much higher overflow rates, with a median of 7.6 SSOs per 100 miles for wastewater-only utilities and 4 SSOs per 100 miles for combined utilities with 15 wastewater-only utilities and 95 combined utilities reporting. The wastewater integrity rates were also much higher in 2005, with a median of 7.6 failures per 100 miles for wastewater-only utilities and 11.1 failures per 100 miles for combined utilities. The wastewater integrity rates were based on 13 reporting wastewater-only utilities and 96 reporting combined utilities.

While there might have been some reduction from the 2005 data due to improved utility performance associated with the increasing emphasis on SSO and system failure rates due to highly publicized EPA enforcement actions, it is unlikely that the median rates actually decreased as much as the limited 2011 survey data suggests.

Thus, PUD's current rate of 5.8 annual SSOs per 100 miles is more likely to be much closer to the current actual benchmark median value, had a more representative group been included in the 2011 benchmarking survey. Further, as mentioned above, PUD's current failure rate of 2.9 annual SSO failures per 100 miles compares favorably to both the limited 2011 survey and the original 2005 survey benchmarking data.

Table 2.1 details the SSO occurrences by cause from FY 2005 through FY 2013.

Table 2.1. SSOs by Cause for FY 2005 through FY 2013

SSO Cause Category	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
Blockages	45	47	45	25	14	16	9	9	8
Grease ¹	0	0	5	0	8	23	26	43	36
PS Electrical Failure	56	62	57	59	78	44	39	33	31
PS Mechanical Failure	21	10	35	31	26	10	11	6	8
Operator ¹	0	0	0	0	0	0	5	6	0
Line Breaks	24	24	28	32	19	15	17	23	19
Pump Failure	0	28	5	0	0	10	0	0	0
Valve Failure	9	5	5	11	4	3	2	1	2
Contractor Errors ²	0	4	7	0	0	0	0	0	0
Contractor Hits	6	6	11	3	18	12	12	10	7
TECO Power Failures	30	28	23	20	24	12	15	4	10
Vandalism	0	1	3	1	0	0	1	0	1
Transport Failure	0	0	1	0	0	0	0	0	0
Rain ³	0	0	0	0	2	3	4	0	0
LPSS TECO-related	1	0	3	6	3	0	0	1	2
LPSS Line Break	5	9	7	0	2	2	2	2	3
LPSS Line Block	0	0	1	1	0	1	1	0	0
LPSS Pump Failure	9	13	17	0	0	0	0	0	0
LPSS PS Mechanical	0	0	21	39	13	8	8	3	1
LPSS PS Electrical	3	3	7	6	6	4	4	4	3
LPSS Tank/Valve	1	0	4	0	1	0	0	0	1
LPSS Contractor	0	6	1	3	5	1	2	1	1
LPSS Rain ³	0	0	0	0	1	0	0	0	0
LPSS Vandalism/Unknown	0	0	1	8	0	0	0	0	0
Annual SSO Totals	210	246	287	245	224	164	158	146	133

¹ Added SSO cause category to provide a greater level of tracking detail.

² Combined contractor errors and contractor hits SSO cause categories due to the low number of events in the contractor error SSO cause category.

³ FY09 Rain SSOs were caused by an "El Nino" weather pattern that brought an even greater amount of rain, in excess of 8-inches per month during May, June, July and August, to the traditional Florida wet season.

2.2 SSO Trend Analysis

Figures 2.2 and 2.3 compare the SSO by cause breakdowns for the peak FY 2007 and the latest FY 2013 data. As the CAMS and CMMS database tools were fully implemented, SSO cause

categories have been refined to either add new tracking categories or combine existing categories with few events. For example, the grease blockages are being tracked more specifically in FY 2013.

Figure 2.2. FY 2007 Peak Year SSOs by Cause

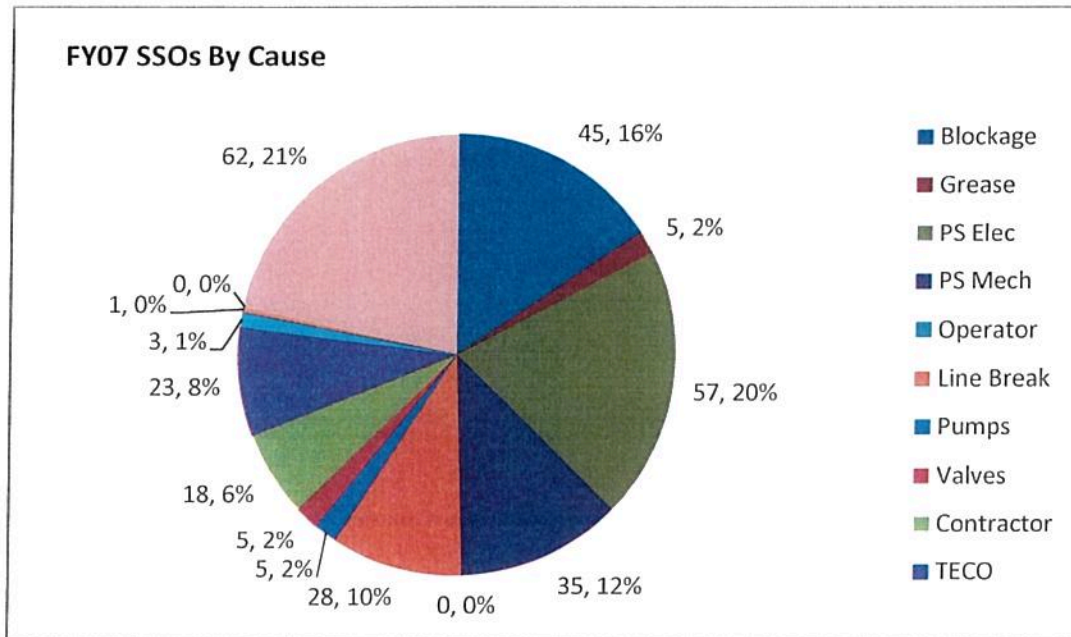
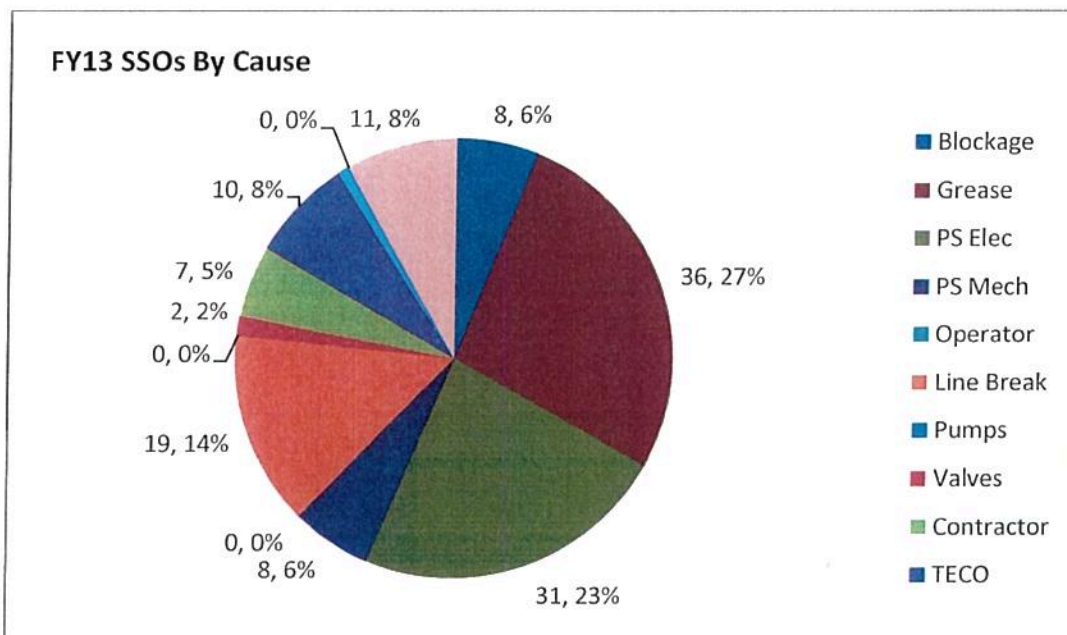


Figure 2.3. FY 2013 Current Year SSOs by Cause



The following comparisons can be made between the current SSO breakdown and the peak year SSO breakdown shown in Figures 2.2 and 2.3:

- The blockage category in FY 2007 included some grease contributing blockages that are being reclassified as a separate cause category in FY 2013. Consequently, the totals for these two categories are a more appropriate comparison than comparing the separate category totals.
 - The number of grease and other blockages are only slightly lower (44 versus 50) in FY 2013, but represents a higher percentage of the annual total (33 percent versus 17 percent) since other types of SSOs have gone down.
 - A detailed review was conducted of 36 SSOs attributed to grease during FY 2013. This analysis determined that the vast majority of grease-related blockages were located in residential areas, with little or no contribution from commercial accounts such as restaurants.
 - Further, PUD has experienced an increase in the number of blockages with evidence of items marked as “flushable” (as well as noting these items as contributing to “ragging” problems in lift stations). These flushable items include pre-moistened personal wipes, super-strong paper towels, toilet bowl cleaning brushes and other similar items. Marketing of these products have been increasing in recent years, resulting in higher usage and a greater number of such products entering, and causing problems within, the sewer system.
- Similarly, the pump station-related categories should be compared at least initially based on the totals for pump station electrical, pump station mechanical and pumps (i.e., pump failures). For this combination of categories, the annual SSOs decreased from 62 to 39, which are both roughly 30 percent of the total number of annual SSOs.
 - Within the pump station-related categories, the more general pump failure category was replaced by the more explicit pump station electrical and pump station mechanical categories.
 - Pump station electrical problems decreased nearly 46 percent from 57 to 31.
 - Pump station mechanical problems decreased 77 percent from 35 to 8.
- Significant decreases were evident in the following categories:
 - The TECO-related power SSOs decreased 57 percent from 23 to 10.
 - The LPSS-related SSOs decreased 82 percent from 62 to 11, with the decrease predominately associated with 91 percent decrease in the LPSS pump-related categories (LPSS Pumps, LPSS PS Mechanical and LPSS PS Electrical) from 45 to 4.
- The line breaks had risen slightly in FY 2012, but are back down slightly in FY 2013, with a decrease of 32 percent from the FY 2007 peak. Due to the reduction in total SSOs, the line breaks represent a higher percentage of the total, at 14 percent versus 10 percent in FY 2007.

- The fluctuation of the contractor errors/hits category is typically reflective of the contractor activity within the county during each reporting period. This is reflected in the high numbers of SSOs in FY 2007, followed by a low number of SSOs in FY 2008, then returning to a high level in FY 2009 before starting a gradual downward trend. The FY 2013 total of 7 is a decrease of 61 percent from FY 2007 peak.
- The remaining categories, valves, vandalism and transport failures, are roughly the same and are all less than 2 percent and some less than 1 percent of the total.

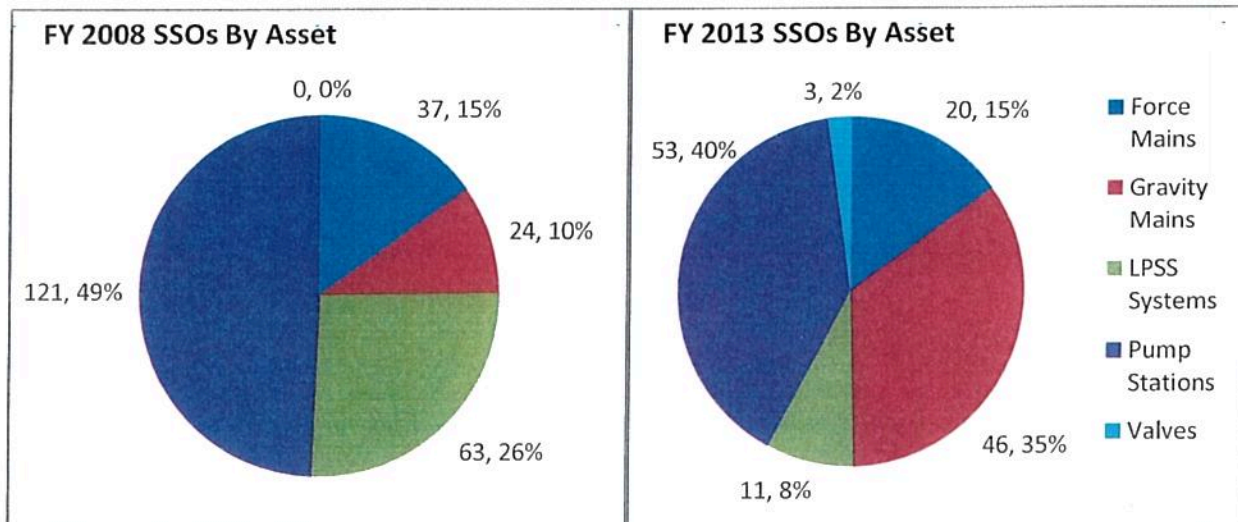
In addition to tracking SSOs by cause, PUD started tracking SSOs by asset type in FY 2008 as shown in Table 2.2.

Table 2.2. SSOs by Asset Type for FY 2008 through FY 2013

Asset Type	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Force Mains	37	28	27	18	21	20
Gravity Mains	24	24	38	38	55	46
LPSS Systems	63	35	25	16	12	11
Pump Stations	121	137	74	84	51	53
Valves	0	0	0	2	7	3
Annual SSO Totals	245	224	164	158	146	133

Figure 2.4 compares the SSO by asset breakdowns for the initial FY 2008 and the latest FY 2013 data. As shown, SSOs attributed to force mains has decreased, but represents the same percentage of total events. SSOs attributed to LPSS system have decreased significantly both in terms of number and percentage. SSOs attributed to pump stations have also significantly decreased in terms of number, but not as much in terms of percentage. SSOs attributed to gravity mains have increased both in terms of number and percentage. Gravity main SSOs increased because of the blockages and grease, while line breaks have been relatively constant.

Figure 2.4. FY 2008 and FY 2013 SSOs by Asset Comparison



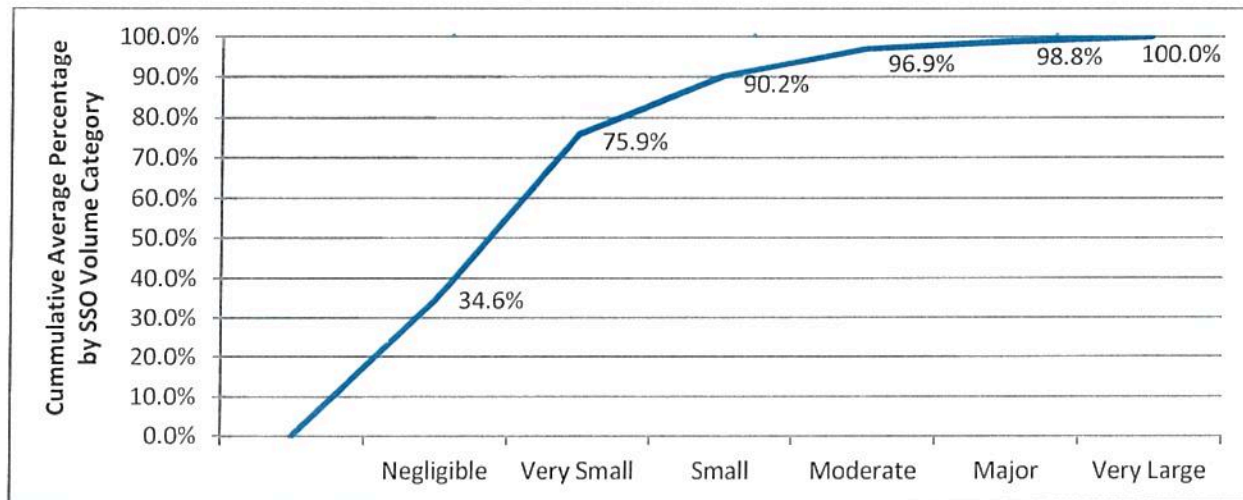
The above discussion has focused on the number of SSO events, but perhaps even more important is the volume discharged. PUD reviewed data from FY 2010 through FY 2013 data as shown in Table 2.3. The SSO volume discharges as tabulated in Table 2.3 are based on the volume initially discharged without subtracting the SSO volumes recovered during the emergency response activities. The distributions of SSOs by volume are illustrated in Figures 2.5 through 2.9 following Table 2.3.

Table 2.3. SSOs by Volume FY 2010 through FY 2013

Volume Category	FY 2010	FY 2011	FY 2012	FY 2013
Negligible (≤ 100 gallons)	58	51	57	42
Very Small (> 100 to ≤ 500 gallons)	71	70	54	54
Small (> 500 to $\leq 1,000$ gallons)	22	21	24	19
Moderate ($> 1,000$ gallons to $\leq 10,000$ gallons)	10	11	7	12
Major ($> 10,000$ to $\leq 100,000$ gallons)	2	4	0	5
Very Large ($> 100,000$ gallons)	1	1	4	1
Annual SSO Totals	164	158	146	133

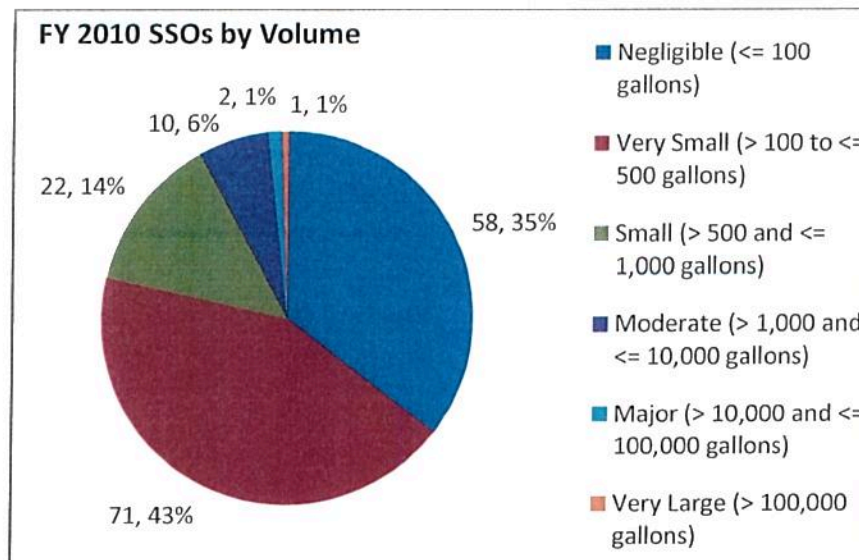
Figure 2.5 shows cumulative percentages for the average number of SSO events in each SSO volume category. As shown, roughly one-third of the SSOs in each fiscal year were negligible at ≤ 100 gallons. Another one-third were very small SSOs between 100 and 500 gallons. Adding in the small SSOs between 501 and 1,000 gallons, brings the cumulative percentage to just over 90 percent. Moderate SSOs between 1,001 and 10,000 gallons brings the cumulative total to just under 97 percent. Major SSOs between 10,001 and 100,000 gallons brings the cumulative total to just under 99 percent. Very large SSOs $> 100,000$ gallons account for an average of 1.2 percent of the total and bring the cumulative total to 100 percent.

Figure 2.5. Cumulative Average Distribution between FY 2010 and FY 2013



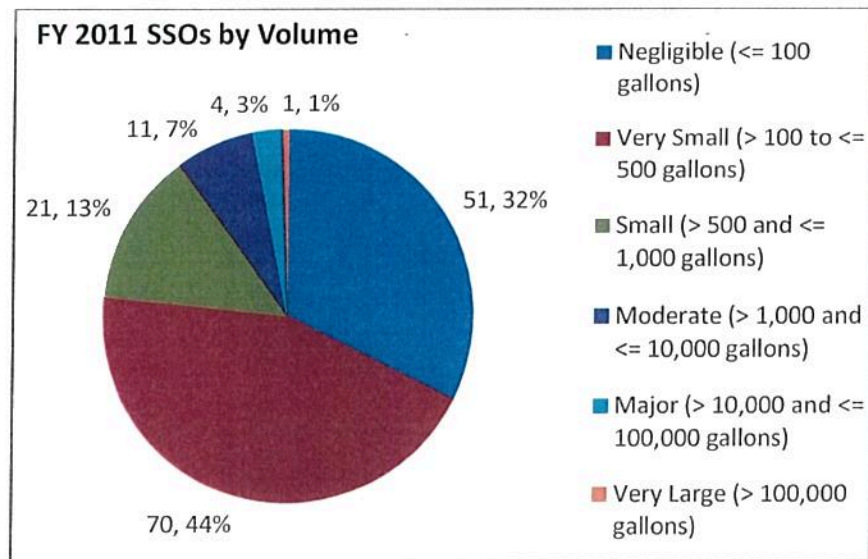
Of the two major SSO events (10,900 and 27,000 gallons) shown in Figure 2.6, one was due to a contractor hit and the second was due to a material failure. The one very large SSO event (131,500 gallons) was due to a contractor hit. Of the 232,800 total gallons discharged, approximately 168,600 gallons were contained and returned to the sewer system.

Figure 2.6. SSOs By Volume Distribution for FY 2010



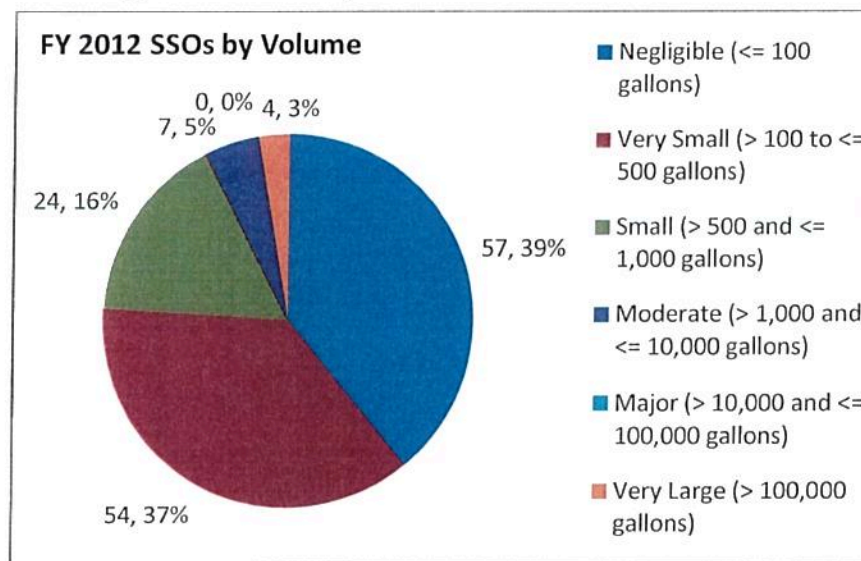
Of the four major SSO events in FY 2011 shown in Figure 2.7, which totaled 16,000; 20,000; 25,000 and 70,000 gallons, two were caused by line breaks (both force mains) and two by contractor hits/errors (one gravity sewer and one pump station). The very large SSO event, which totaled 670,000 gallons, was caused by a line break (force main). Roughly 116,300 of the 801,000 gallons spilled were recovered and returned to the sewer system.

Figure 2.7. SSOs By Volume Distribution for FY 2011



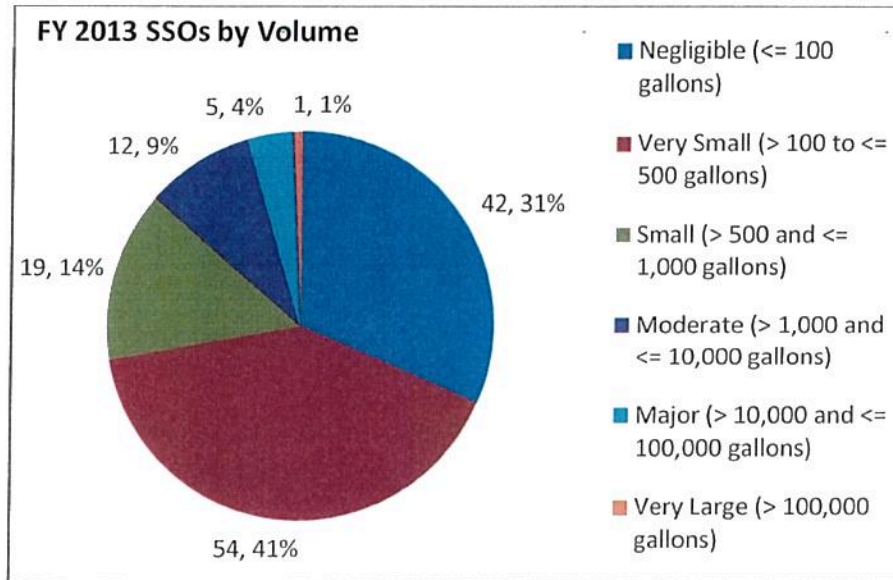
As shown in Figure 2.8, there were no major SSOs in FY 2012. Of the four very large SSOs, two (138,000 and 195,500 gallons) were caused by line breaks (force mains); one (126,000 gallons) was caused by a contractor hit (force main); and one (217,800 gallons) was caused by a force main valve.

Figure 2.8. SSOs By Volume Distribution for FY 2012



Of the five major SSOs in FY 2013 shown in Figure 2.9, four (15,000, 15,000, 27,216 and 86,000 gallons) were caused by line breaks (all force mains) and one (25,000 gallons) was caused by a contractor hit (force main). The one (170,000 gallons) very large SSO in FY 2013 was caused by a line break (force main). Of the total 338,216 gallons spilled in FY 2013, approximately 146,000 gallons were recovered.

Figure 2.9. SSOs By Volume Distribution for FY 2013



Several of the force main line breaks in recent years were associated with the Memorial force main. This force main was installed in 1978 and has had several isolated corrosion problems. Recognizing that the Memorial force main posed a higher risk for future SSOs, PUD instituted a fast track line replacement initiative and began to replace the force main in August 2012. The replacement was completed December 20, 2013 at a cost of over \$2.8 million. The total length of the force main replacement was 12,469 feet with 8,206 feet of 16-inch polyvinyl chloride (PVC) pipe replacing existing 14-inch ductile iron pipe.

3 COMPLIANCE ACTIONS

This section summarizes the current status of AOC requirements and PUD's improvements under the AOC. Section 3.1 describes overall compliance status for the AOC requirements. Sections 3.2, 3.3 and 3.4 categorize PUD's improvements in the areas of management improvements, asset management practices, and operations and maintenance (O&M) enhancements, respectively.

3.1 AOC Compliance Overview

The AOC requirements and associated EPA Region 4 submittal dates are listed in Table 3.1. As shown in Table 3.1, PUD has completed all AOC requirements except for the submittal of Annual Reports. The Third Annual Report, which would have gone through December 31, 2010, was thought to have been submitted along with a request to close the AOC. It was not until December 2013 that PUD became aware that EPA Region 4 did not have the Third Annual Report or the closure request. This Final Report is designed to correct that deficiency as well as to provide additional data through FY 2013, which ended September 30, 2013.

Table 3.1. AOC Compliance Summary

AOC Requirement	Status	EPA Submittal Name and Date
Paragraph 8 Continuing Collection & Transmission System Evaluation & Rehabilitation Plan (CTSERP) ²		
Prioritize areas where rehabilitation work will be performed	Completed	<u>CTSERP</u> , June 6, 2011
Conduct sewer flow monitoring to support engineering analysis ¹	Ongoing	<u>CTSERP</u> , June 6, 2011
Conduct inspections of manholes, sewer lines and public portion of service laterals	Completed	<u>CTSERP</u> , June 6, 2011
Prioritize defects	Completed	<u>CTSERP</u> , June 6, 2011
Identify sewer pump stations and force mains that need rehabilitation due to capacity, mechanical or other reason	Completed	<u>CTSERP</u> , June 6, 2011
Prioritize and implement rehabilitation of pump stations and force mains	Completed	<u>CTSERP</u> , June 6, 2011 ²
Paragraph 9 Continued Implementation of Management, Operations & Maintenance (MOM) Program		
Implement all MOM Programs	Completed	<u>MOM Program Plan for Continuous Improvement</u> , June 4, 2010
Provide adequate funding and resources for the development and implementation of all MOM Programs	Completed	<u>MOM Program Plan for Continuous Improvement</u> , June 4, 2010
Paragraph 10 Documentation & Report Submittal		
Submit Annual Progress Reports ³	In Progress	April 1 of each CY

¹ As explained in the CTSERP and demonstrated by the minimal rain-related SSOs in Table 2.1, the collection system does have capacity-limited facilities and a gravity flow monitoring program was not required. PUD does monitor flows at pump stations at about 60 PSs/year and continuously at about 136 SCADA-monitored PSs. Another 361 PSs will be monitored under Phase 2 of the SCADA installations. PUD also purchased 6 Flow-Dar liquid level transmitters in FY 12 that are being used to isolate high flow I/I areas identified by long run times at receiving PSs.

² The CTSERP was submitted June 6, 2011; however, EPA Region 4 has been able to locate a copy of this submittal. Upon being notified of the problem in December 2013, PUD re-submitted the CTSERP.

³ First Annual Report submitted March 27, 2009. Second Annual Report submitted March 31, 2010. The Third Annual Report and Closure Request had been thought to have been submitted in April or May 2011; however, neither PUD nor EPA Region 4 have been able to locate copies of these submittals.

3.2 Management Improvements

In addition to the organizational improvements associated with the County's departmental restructuring as shown in Figure 1.1, PUD has implemented a number of managerial process improvements to improve efficiency, productivity and effectiveness as described below.

Data tracking and information management are key data elements required to ensure all levels of the organization have timely access to accurate data on asset condition and performance so that the right decisions can be made. When the AOC became effective in 2008, WRS (and then PUD) had just started to implement CAMS and CMMS software and tools. The CAMS and CMMS implementation required a significant expenditure both in terms of capital funding and personnel training to ensure that the hardware and software was properly set up and that accurate data was being input. To facilitate this, upon commissioning of the systems, CMMS data fields were reviewed to sure they were completely filled out and the software codes were being consistently interpreted and applied. On an ongoing basis, PUD managers continue to ensure data accuracy and consistency by selecting a random 15 percent of each type of work order (daily, weekly, monthly and annual) to conduct a quality assurance/ quality control (QA/QC) check. These checks are designed to verify the work orders were actually completed and were accurately recorded in CMMS.

As the CMMS database became populated with accurate information on the time and resources required to complete various types of jobs, PUD developed performance standards to track actual performance against those standards. Crews not meeting a particular standard are investigated to identify causes for performance deviations so that adjustments, such as additional training or different tools/resources, can be made or provided.

As part of the performance standard setting, existing Standard Operating Procedures (SOPs) were reviewed and updated as necessary to ensure up-to-date, efficient and effective procedures were in place and properly documented.

As part of the MOM Program Plan for Continuous Improvement, PUD established key performance measurements for each of the EPA Region 4's required MOM Programs. The key performance measurements were listed in Table 1.1 of that report. Appendix A contains the current key performance measurement listing that is being used by PUD along with a brief summary of the current status of the performance measures.

As documented in Appendix A, PUD has been able to successfully meet most of the MOM Program performance measures that had been defined in the MOM Program Plan for Continuous Improvement. The most significant performance measure that still needs to be met is the goal to reduce annual benchmark SSOs to less than 4 per 100 miles of sewer. The FY 2013 benchmark measure is 5.8 SSOs per 100 miles. Assuming no growth in sewer system mileage totals, the annual number of SSO events will have to reach 91 events to meet the benchmark performance measure. Further, in accordance with the MOM Program philosophy for continuous improvement, upon reaching the benchmark SSO goal, the goal will be further reduced to an ultimate "zero" SSO goal that eliminates SSO events. While it is recognized that a zero SSO goal is extremely difficult to achieve in an aging utility subject to tropical storm events and dealing with situations beyond the control of any well-functioning utility, PUD is committed to eliminating SSO events that are within the utility's ability to control.

Several of the other MOM Program's performance measures have been delayed because of the lower rate of system growth associated with development within the County. For example, the Sewer System Design (B.5.4) and the System Capacity Assurance (B.5.9) MOM Programs both included goals for annual updates of the Wastewater Master Plan with a comprehensive update every 5 years. Due to the lack of growth, more limited area updates were performed and the 5 year comprehensive update was postponed.

Similarly, the Continuous Sewer System Assessment (B.5.7) MOM Program goal to develop an automated infrastructure analysis tool utilizing CAMS information to prioritize and plan for the repair and replacement of pump stations, force mains, gravity sewers and manholes has been delayed to the end of FY 2014 with a separate reporting tool to be developed by the end of FY 2015. The work is currently being performed manually.

The Customer Service (B.9) MOM Program had goals associated with customer satisfaction that were being measured using a new customer survey. PUD stopped mailing the new customer surveys in June 2011 to re-evaluate the questions on the survey. The survey has not been reinstated.

PUD has not re-instituted routine hydraulic cleaning of the sewer system as fast as envisioned under the Routine Hydraulic Cleaning (D.2.1 & 4.1) MOM Program goal of cleaning a minimum of 10 percent of the system starting in FY 2012. The entire system had been cleaned as part of the AI&A Program (see Section 3.3 below for a detailed description of the AI&A Program) so the routine hydraulic cleaning was eliminated in subsequent years. This failure is being addressed with the implementation of a new \$7.7 million slip lining and cleaning contract in FY 2014 that will clean approximately 44 miles in the North service area portion of the collection system. The contract will start in the River Oaks area where blockages, particularly grease-related blockages, have been identified to be more of a problem than other areas of the collection system.

PUD's proactive Maintenance of Rights-of-Way and Easements (D.4.1) MOM Program has only been partially implemented. PUD is still inventorying easement areas and populating the County's GIS mapping database. Inspections and maintenance are currently still being performed on a reactive basis until the inventory is complete and automatic work orders can be generated.

3.3 Asset Management Practices

As detailed in the CTSERP, during the 1990s and the early 2000s, the County experienced significant and rapid growth throughout the service area. At the same time, the oldest portion of the infrastructure base was many decades old. It became apparent that run-to-failure and reactive maintenance strategies were no longer working for the County. Thus, as PUD entered the new century, the Department implemented an advanced asset management strategy (i.e., CAMS) designed to move into a proactive maintenance strategy based on predictive failure analysis.

PUD's asset management-focused efforts are described below as a three-step program: (1) Asset Inventory and Condition Assessment, (2) Asset Prioritization, and (3) Capital Improvement Program (CIP) Project Implementation.

3.3.1 Asset Inventory and Condition Assessment

The first step in implementing an asset management-focused program is to understand the asset locations and condition. PUD accomplished this through an extensive Asset Inventory and Assessment (AI&A) Program as described below.

Under the AI&A Program, PUD prioritized asset inventory and condition assessment according to asset type rather than by geographic area. The AI&A included the following four project contracts:

- **Gravity System Inventory and Condition Assessment.** This \$8.7 million project collected Global Positioning System (GPS) coordinates for manholes and sewer cleanouts, inspected manholes, cleaned and inspected (via in-line closed circuit television inspection [CCTV]) gravity lines, evaluated the condition of each line and manhole, and populated the Geographic Information System (GIS) and asset management software with information gathered.
- **Pressure Pipe Appurtenance Inventory.** This \$1 million project located and obtained GPS coordinates for the County's valves, hydrants, large meters and blow offs, and populated the GIS and asset management software with information gathered.
- **Water and Wastewater Plant and Pumping Station Equipment Inventory and Condition Assessment.** This in-house project inventoried and conducted condition assessments for all real estate, structures, and the mechanical and electrical equipment.
- **Pressure Pipe Condition Assessment.** Building on the information gathered in the Pressure Pipe Appurtenance Inventory, this \$4.5 million project refined pressure pipe locations, prepared a database of historical pipe failures, and performed increasing levels of analyses beginning with predictive failure, exhumation and laboratory testing of those pipe sections predicted to have the highest probability of failure. This information was loaded into the CAMS to be used to proactively alert field maintenance personnel when pipes have reached the end of their useful life or otherwise need repair.

In addition to these AI&A projects, PUD conducted an extension of the in-house plant and pumping station equipment inventory and condition assessment project to further develop pump station conditions assessments. Under this extension, PUD initiated an agreement with the University of South Florida to utilize engineering graduate students to assist PUD personnel in completing the condition assessment of the wastewater pump stations. All of the AI&A projects, and the pump station assessments, have been completed and are being used to predict failure and to prioritize rehabilitation prior to failure as described below.

The asset management work completed under the AI&A Program has been featured in a series of articles in the Underground Infrastructure Management magazine. Copies of these articles were included in previous Annual Reports. The AI&A inspection and condition assessment results are summarized below for the key collection system assets.

Manhole and Gravity Sewer Inspection Results. Based on the results of zoom camera inspection under the AI&A inventory project, an additional 900,000 linear feet of pipe was cleaned either to correct maintenance problems or to enable more comprehensive in-line CCTV inspection. Manholes and pipelines assigned a maintenance score of 3, 4 or 5 were cleaned to prevent grease, debris and obstruction related backups and overflows from occurring. Pipelines assigned a structural score of 4 or 5 were cleaned and inspected with in-line CCTV to collect more detailed information. (The condition scoring system is described in greater detail in the below Subsection 3.3.2, Asset Prioritization.) Less than 1 percent of the collection system pipelines required follow-up in-line CCTV inspection to determine the need for future structural repairs.

As noted in previous Annual Reports, the results of the AI&A Program were generally more positive than had been expected, particularly for the gravity mains. This was attributed to the fact that the County completed two CIP projects about 10 years prior to initiation of the AOC that addressed “the worst of the worst” defects in the County’s gravity system. One project was a manhole rehabilitation project and one was a gravity pipeline slip-lining project. As discussed later in this report, these projects were reinstituted as ongoing CIP Master Projects that are expected to continue essentially in perpetuity since the sewer system manholes and pipes will continue to experience age- and service-related deterioration.

During FY 2011, routine manhole and gravity pipeline inspection activities were reinitiated (after being suspended during the AI&A inspection project duration) to ensure condition assessments remain current.

Pump Station Inspection Results. Pump station inspection and condition assessment was completed by PUD staff assisted by University of South Florida engineering graduate students. The residential LPSS pump systems are on a 5-year inspection schedule. The 213 commercial LPSS pump systems are on a 1-year inspection schedule. Out of the 705 pump stations inspected, 235 pump stations were considered Condition 3, Moderate; 110 pump stations were considered Condition 4, Poor; and 360 were considered Condition 5, Very Poor. A more detailed breakdown of the number of pumps in condition codes 3 through 5 is included in Table 3.2 in the following Asset Prioritization subsection. PUD has rehabilitated or replaced all of the functional Condition 5 facilities that were near imminent failure. Remaining Condition 5 facilities are not those that would result in SSOs such as fences and driveways.

Force Main Inspection Results. For the force main assessments, which are difficult to inspect by internal CCTV techniques common to gravity system inspection, required destructive testing methods. During the destructive testing, 260 pipe samples (or “coupons”) were taken. These samples were analyzed and the results used to develop predictive failure models. Probabilistic

modeling used to predict future failure using realistic failure mechanisms of fracture for polyvinylchloride (PVC) pipe, cement loss and strength reduction for asbestos cement pipe and corrosion/fracture for cast and ductile iron pipe. Predicted remaining useful life estimates were loaded into CAMS. All force mains with predicted Condition 4 or 5 have been added to the CIP Master Fund list with the exception of two lines that require a stand-alone project due to the potential budget amount. Most of the predicted 4- and 5-ranked pipelines are older, schedule 40 PVC, which are being replaced based on this fact alone.

3.3.2 Asset Prioritization

The second step in implementing an asset management-focused program is to build on the asset understandings developed in the first step by developing an effective asset prioritization plan.

Manhole, gravity sewer, and pump station assets have been prioritized for additional rehabilitation using a risk based methodology (as opposed to the force mains, which used predicted failure models) to determine asset risk levels based on asset condition and criticality. As detailed in the CTSERP, asset condition is a measure of the probability of failure on a 5-point scale from "Excellent" to "Very Poor." Asset criticality is a measure of the consequence of failure on a 9-point scale from "Non-Essential or Aesthetic" to "Impact to Public Safety or Services." The resulting asset risk level is the "product" of the asset condition score times the asset criticality score. Risk levels are assigned on a 5-point scale from "No Risk" to "High Risk" as illustrated in Figure 3.1. Essentially, the Condition 5, Very Poor, assets that are presumed to be within 5 years of failure, are addressed first, from those with the highest criticality scores to the lowest criticality scores. Assets with Condition 4, Poor, are addressed next, again from highest criticality to lowest criticality, with the exception that Condition 4 assets that are in the top Criticality 9, Public Safety or Services Impact, are included with the Condition 5 assets prioritization.

Figure 3.1. Risk Matrix and Risk Rating Definitions

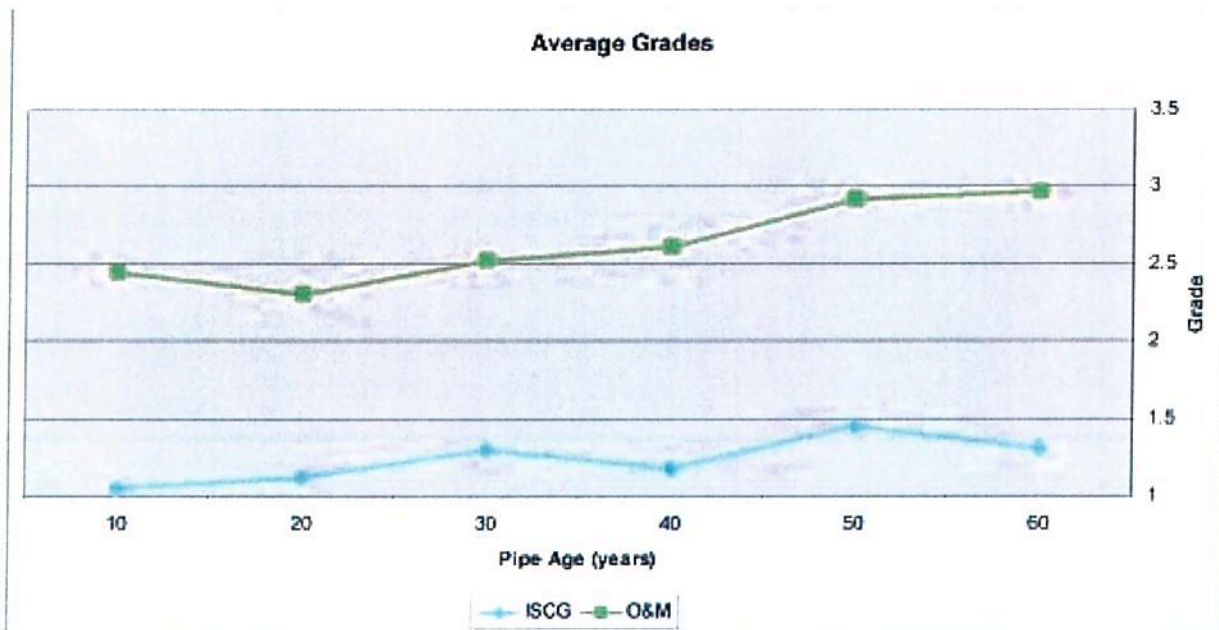
Risk Rating Legend: High Risk (red); Medium Risk (orange); Low Risk (yellow); Minimal Risk (blue); No Risk (green)

Risk Rating = Condition Score times Criticality Score		Renewal Condition Score (measure of probability of failure)				
		1 Excellent	2 Good	3 Moderate	4 Poor	5 Very Poor
Criticality Score (measure of consequence of failure)	1 Non-Essential or Aesthetic	Green	Green	Green	Blue	Yellow
	2 Support Equipment/ Structures	Green	Green	Blue	Yellow	Orange
	3 Minimal Capacity/ Plant Production	Green	Green	Blue	Yellow	Orange
	4 Minor Plant Production Impact	Green	Blue	Yellow	Orange	Orange
	5 Minor Capacity Impact (Pipes Only)	Green	Blue	Yellow	Orange	Orange
	6 Major Transport/Moderate Plant Production	Green	Blue	Yellow	Orange	Orange
	7 Major Capacity Impact (Pipes Only)	Green	Blue	Yellow	Orange	Red
	8 Major Plant Production Impact	Green	Blue	Yellow	Orange	Red
	9 Public Safety or Services Impact	Blue	Yellow	Orange	Red	Red

Manhole and Gravity Sewer Prioritization. Due to the relatively low number of manholes and gravity sewers found to be in poor or very poor condition, manhole and sewer rehabilitation projects were defined as part of annual manhole rehabilitation and sewer slip-lining contracts. Manholes and sewers with condition scores of 4 and 5 are rehabilitated first. Rehabilitation has been completed for many of those assets. Manholes and sewers are added to the rehabilitation list based on the results of the ongoing inspections that were restarted in FY 2011.

Figure 3.2 shows the average structural scores by pipe age from the AI&A condition assessment. The average structural score for the gravity pipelines was 1.08, which equates to a score of 1, excellent. The largest defect category was VCP pipe with 40 percent (213 pipelines) with cracked pipe and 33 percent (169 pipelines) with joint defects. Overall, only 518 VCP pipelines out of 3,590 VCP pipelines observed had structural defects.

Figure 3.2. Average Gravity Pipeline Condition Scores by Pipe Age



The identified manhole defects were corrected by 2012. The primary problem identified with the sewer pipe was vitrified clay pipe (VCP). These defects are being addressed by annual slip-lining contracts. All of the VCP pipelines with Conditions 4 and 5 defects have been slip-lined. PUD also addressed all ductile iron pipelines that are terminal to pump stations. Summary totals for the slip-lining projects further described in the below Subsection 3.3.3, CIP Projects Implementation (see Tables 3.3 and 3.4).

Pump Station Prioritization. Pumps and pump stations were prioritized for rehabilitation based on the inspection and condition assessment findings as follows:

- *Condition 1, Excellent.* Pumps that are new to 2-years old or have O&M repair expenditures less than 14 percent of the cost of the station's construction cost.
- *Condition 2, Good.* Pumps that are over 2-years old to 4-years old or have O&M repair expenditures between 14 and 28 percent of the cost of the station's construction cost.
- *Condition 3, Moderate.* Pumps that are over 4-years old to 6-years old or have O&M repair expenditures between 28 to 42 percent of the cost of the station's construction cost.

- *Condition 4, Poor.* Pumps that are over 6-years old to 8-years old or have O&M repair expenditures between 42 and 56 percent of the cost of the station's construction cost.
- *Condition 5, Very Poor.* Pumps that are over 8-years old to 10-years old or have O&M repair expenditures more than 56 percent of the station's construction cost.

As with the manholes and gravity sewers, pump and pump stations are prioritized for rehabilitation or replacement based on the condition scores, with Condition 5, Very Poor, and Condition 4, Poor, pumps addressed first. Table 3.2 summarizes the number of pumps in functional condition categories 3, 4 and 5 at the end of each fiscal year since completion of the condition assessments. Completed rehabilitation or replacement projects to address the deficient pumps are noted in the below CIP Projects Implementation. Replacement and rehabilitation decisions for pump stations depend on a multitude of factors including such things as whether some or all of the pumps require replacement, whether there is sufficient room in the station for additional or larger pumps, the condition of the non-pump components in the station, etc. Pump stations that only require existing pump repairs can be corrected quickly. Pump stations that require a full rehabilitation or replacement project can take 2 to 3 years to complete. However, as shown in Table 3.2, the number of Condition 3, 4 and 5 pumps is decreasing each year despite the fact that additional pumps are added to the category as pumps continue to deteriorate with age and use. At the end of FY 2013, the 245 pumps in Condition 5 represented less than 10 percent of the pumps in full-time operation.

Table 3.2. Wastewater Pump Condition Summary

Fiscal Year ¹	Condition 3 Pumps ² (#)	Condition 4 Pumps ² (#)	Condition 5 Pumps ² (#)	Total Number of Pumps ³ (#)
FY 2011	258	110	360	728
FY 2012	253	100	330	583
FY 2013	75	51	245	511

¹ The number of pumps within each condition category varies each year as pumps and pump stations are replaced/rehabilitated and others are added to the category due to age-related deterioration.

² Over the last three years, PUD has purchased 377 replacement pumps and 113 spare pumps.

³ The overall number of pumps varies not only from year-to-year, but from day-to-day. As of the February 2014 date of this report, PUD had an overall count of 2,642 pumps in full-time operation.

Pump station rehabilitation/replacement CIP projects are further described in the below Subsection 3.3.3, CIP Projects Implementation (see Tables 3.3, 3.5 and 3.6).

Force Main Prioritization. Force main prioritization takes place through a multi-faceted approach. The most common pipe materials to fail in the sewer system are addressed. All schedule 40 polyvinylchloride (PVC) and asbestos cement (AC) force mains are deemed to be substandard and at the end of their useful life based on field experience and results from the

Pressure Pipe Inventory and Assessment project. Because of this, PUD has implemented two annual Master Projects to systematically replace all schedule 40 PVC and AC force mains.

Field experience also triggers pipeline replacement. Results of the Asset Inventory and Assessment project revealed that a pipeline that has failed once is seven times more likely to fail again than one that has never failed. Force mains will continue to be inspected for problems as they approach the end of their expected useful life and added to the replacement list as appropriate.

Force main rehabilitation/replacement CIP projects are further described in the below Subsection 3.3.3, CIP Projects Implementation (see Tables 3.3 and 3.7).

3.3.3 CIP Projects Implementation

The third step in implementing an asset management-focused program is to utilize the asset prioritization plan to implement a multi-year, long term CIP.

PUD tracks CIP projects using two categories: Master Projects and Stand-Alone CIP Projects. The Master Projects are generally the ongoing annual renewal needs that require annual expenditures. The Stand-Alone projects vary from year-to-year and include the non-recurring projects and the larger projects that are too complex to be included as part of the Master Project contracting mechanisms. The Master Projects include the following categories:

- Three pump station projects (wastewater refurbishment, wastewater replacement and reclaimed water)
- Five pipeline projects (force main repair/refurbishment, manhole inspection and rehabilitation, slip-lining, LPSS system and new developments)
- One plant project (treatment plant repair/refurbishment)

Appendix B contains a listing of all of the wastewater and reclaimed water projects delivered in FY 2008 through FY 2012. Table 3.3 summarizes the funding totals for these projects over the same period. As previously indicated, it is expected the CIP Master Projects will continue essentially in perpetuity to address ongoing age- and condition-related deterioration.

**Table 3.3. Wastewater and Reclaimed Water Project Summary
FY 2008 through FY 2013**

Fiscal Year	Master Projects	Stand-Alone CIP Projects	Fiscal Year CIP Totals
FY 2008	11,416,977	53,060,951	64,477,928
FY 2009	13,399,565	187,892,773	201,292,338
FY 2010	8,216,969	11,345,000	19,561,969
FY 2011	11,492,673	25,755,791	37,248,464
FY 2012	14,430,790	15,237,920	29,668,710
FY 2013	11,533,627	11,590,501	23,124,128
Totals	70,490,601	304,882,936	375,373,537

Manhole and Gravity Sewer CIP Projects. PUD has a recurring annual contract, the Wastewater Slip Lining Master Project, for manhole rehabilitation and gravity sewer rehabilitation. Table 3.4 summarizes the manholes and sewers rehabilitated following completion of the AI&A Program.

Table 3.4. Manhole and Gravity Sewer Rehabilitation Summary

Year	Manholes Rehabilitated ¹ (#)	Sewers Slip-Lined ² (#)	Sewers Slip-Lined ² (feet)	Sewers Slip-Lined ² (miles)
2005 - 2007	Not available	Not available	58,000	11.0
2007 - 2009	Not available	Not available	101,000	19.1
FY 2010	37	147	35,685	6.8
FY 2011	274	225	60,850	11.5
FY 2012	3	373	79,380	15.0
FY 2013	91 ³	136	33,269	6.3
Totals	405	881	209,184	69.7

¹ The Manhole Inspection & Rehabilitation Program (Master Project) totaled approximately \$142,000 in FY 08; \$263,000 in FY 09; \$87,000 in FY 10; \$1,829,000 in FY 11; \$290,000 in FY 12; and \$41,000 in FY 13, for a total expenditure of nearly \$2.7 million.

² The Wastewater Slip-Lining (Master Project) totaled approximately \$1,197,000 in FY 08; \$21,345,000 in FY 09; \$25,000 in FY 10; \$24,000 in FY 11; \$2,734,000 in FY 12; and \$1,172,000 in FY 13, for a total expenditure of nearly \$6.5 million. Additionally, the County spent \$950,000 in FY 10 for a gravity sewer replacement Stand-Alone CIP Project, bringing the overall total to over \$7.4 million in gravity sewer renewal expenditures. The new FY 14 slip-lining contract will include 231,000 feet (44 miles).

³ An additional 113 are under construction.

Pump Station CIP Projects. Pump stations were prioritized for rehabilitation based on the inspection and condition assessment findings. As demonstrated by Table 3.2, the number of

Condition 5 and 4 pump stations is decreasing due to the various Master Project and Stand-Alone CIP Projects implemented to proactively address pump station rehabilitation and replacement needs even though stations are added to the condition categories due to age-related deterioration.

Engineering and Operations & Maintenance staffs meet quarterly to evaluate and prioritize pump stations in need of repair or upgrades. Assets representing the highest risk are placed at the top of the list and addressed first. Since this is an ongoing process, pump stations that experience rapid degradation can be moved quickly to positions of higher priority. The utility has rehabilitated or replaced all facilities that were functionally Condition 5. The continuing objective of the pump station team is to continue improvement of the system such that any station with a functional condition of 3 is scheduled for rehabilitation prior to failure. Tables 3.5 and 3.6 summarize the pump station improvements and LPSS pump improvements under the various Master Projects and the Stand-Alone CIP Projects, respectively. For the LPSS stations, the ABS pumps were replaced with Flygt pumps due to ABS pump failures.

Table 3.5. Wastewater Pump Station Rehabilitation Summary

Fiscal Year ¹	New Spare Pumps (#)	Full Pump Station Rehabilitation (#)	Partial Pump Station Rehabilitation (#)	Pump Station Rehabilitation in Construction (#)	Pump Station Rehabilitation Totals (#)
FY 2011	10	22	22	0	44
FY 2012	3	20	8	4	32
FY 2013	100	16	7	24	47
FY 2014	0	11	0	13	24
Totals	113	69	37	41	147

¹ The two Countywide Major Wastewater Pump Station Refurbish (Master Project) and Countywide Wastewater Pump Station Replacements (Master Project) totaled approximately \$5.1 million in FY 08; \$5.9 million in FY 09; \$5.1 million in FY 10; \$5.2 million in FY11; \$5.6 million in FY 12; and \$6.0 million in FY 13, for a total expenditure of nearly \$33 million. In addition to the Master Projects, Stand-Alone CIP Projects for pump station renewals included \$1.1 million in FY 08; \$8.4 million in FY 09 (including a SCADA project); \$0.6 million in FY 10; \$8.2 million in FY 11; \$2.0 million in FY 12; none in FY 13, for a total expenditure of nearly \$20.2 million. The combined Master Project and Stand-Alone CIP Project totals over \$53 million in pump station renewal expenditures.

Table 3.6. LPSS System Rehabilitation Summary

Fiscal Year ¹	New LPSS Units Installed (#)	LPSS Systems Retrofitted or Rehabilitated ² (#)
FY 2008	34	19
FY 2009	27	16
FY 2010	20	5
FY 2011	11	30
FY 2012	27	134
FY 2013	21	44
Totals	140	248

¹ The Low Pressure Sewer System (LPSS Master Project) totaled approximately \$1.4 million in FY 08; \$1.0 million in FY 09; \$0.7 million in FY 10; \$1.0 million in FY 11; \$1.5 million in FY 12; and \$1.3 million in FY 13, for a total expenditure of just over \$7 million.

In addition to the pump station condition assessment-associated improvements, PUD has been expending considerable CIP funds to implement Supervisory Control and Data Acquisition (SCADA) monitoring and control equipment as part of PUD's O&M needs.

The first phase of the SCADA project was completed in September 2009 and included installation of two communication towers and initial connection of 157 pump stations. Selection of the first 157 pump stations was based on a desire to have some coverage in all areas of the County to ensure all PUD personnel would have the opportunity to become familiar with SCADA the system's O&M needs and data capabilities. Phase II of the SCADA project is underway and will include 316 pump stations. Phase II FY 2013 and year to date (February 2014) totals include approximately 62 completed SCADA installations completed and 40 SCADA installations waiting on antennae calibration. The remaining Phase II installations are scheduled to be completed by April 15, 2015. Phase III of the SCADA project will include 337 pump stations. Installation target dates have not yet been established.

The LPSS system pump stations have also been the focus of much of PUD's maintenance staff's attention due to the large number of SSOs associated with those systems. Many of the LPSS systems were installed as part of the EPA Innovative and Alternative grant funding program to replace failing septic systems. The systems tend to be located in remote areas of the County and that are hard for maintenance personnel to reach, especially when the residents failed to call in alarms.

PUD first tried a SCADA solution using individual monitors on each pump, along with collector units. The information was to be transmitted from the monitors to the collectors to the utility via a cellular phone technology. In 2010, 19 pilot units were installed, but the collectors failed and the pilot program was aborted. In December 2010, a second pilot was undertaken using the

Grinder Pump Guardian (GPG) solution from High Tide Technologies, LLC. GPG uses individual (wireless) grinder monitors, neighborhood Collectors, High Tide's servers and Orbcomm's low earth orbit (LEO) satellite system to collect and transmit data. The GPG solution provides the utility with wireless monitoring of all assets, including remote ones, as well as desired alarm notifications. Each monitor functions as a radio repeater so the individual pump stations can be a long way from the Collector module. Also, the solution is highly scalable. It can be installed one point at a time, or it can quickly be deployed to monitor a larger number of pumps. PUD-designated personnel are given access to a secure web interface on High Tide's servers, which can be accessed from any internet-connected computer in any location and at any time of day or night. Users can view current and historical data, as well as receive notifications such as high water alerts and excessive start and runtime events. Personnel are able to input service history and manage alarms through the server. Units in alarm are identified by name and street address, and a mapping feature on a web page easily guides utility personnel to each unit. Personnel are notified via text, phone call or pager.

There are currently 1,251 total LPSS locations within the County service area. Of that total, 1,150 units have a GPG unit, and an additional 14 units have a Collector unit installed, leaving only 87 LPSS units without a SCADA monitoring system. PUD plans to have all LPSS units under a SCADA system by the end of June 2014. With the installation of SCADA monitoring capability and the various LPSS improvement projects to replace failing pumps, rebuild control panels and implement proactive maintenance activities, the , the overall number of annual SSOs has been reduced by about 15 percent. PUD's successful LPSS improvements were noted in the "Low Pressure Sanitary Sewer System Challenges and Solutions" paper presented at WEFTEC 2013, October 2013.

As recent heavy rains through the service area are causing more failing septic systems, the County is seeing increasing pressure to convert even more septic tanks to LPSS systems. This is causing additional pressure on the utility's budget since it costs about \$20,000 to convert septic systems, but the County connection fee policy only allows a recovery of \$1,500 per connection.

Force Main Prioritization. Force main assessments included 44 segments with 5 rated Condition 3, 18 segments rated Condition 4 and 11 segments rated Condition 5. Table 3.7 summarizes the force main rehabilitation projects based on the assessment findings, as well as some force main projects completed prior to completion of the AI&A assessments.

Table 3.7. Force Main Rehabilitation Summary

Fiscal Year	Force Mains Rehabilitated/Replaced ¹ (#)	Force Mains Rehabilitated/Replaced ¹ (miles)
FY 2008	4	5.6
FY 2009	1	0 ²
FY 2010	2	3.9
FY 2011	1	3.7
FY 2012 ¹	0	0
FY 2013	2	2.8
Totals	10	16.0

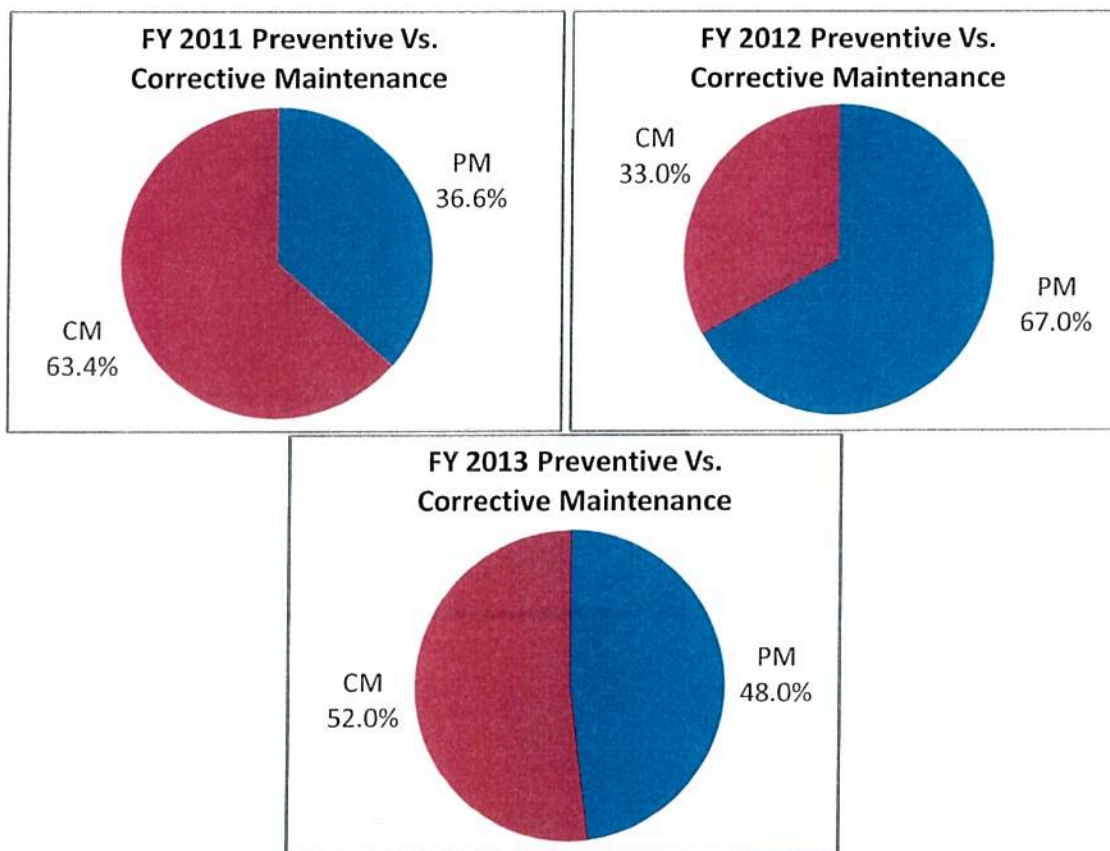
¹ The Countywide Wastewater Force Main R&R (Master Project) totaled approximately \$82,000 in FY 10; \$993,000 in FY 11; \$251,000 in FY 12; and \$704,000 in FY 13, for a total expenditure of just over \$2 million. The Force Main Stand-Alone CIP Projects totaled approximately \$14.0 million in FY 08; \$2.0 million in FY 09; \$7.3 million in FY 10; \$13.0 million in FY 11; and \$6.2 million in FY 13, for a total expenditure of approximately \$42.5 million.

² No appreciable length identified with this large valve replacement CIP Project #10642 (see Appendix B).

3.4 Operation and Maintenance Enhancements

PUD's corrective actions under the AOC have not only implemented more effective utility management and addressed proper asset management practices, but have focused on day-to-day improvements in O&M activities. Figure 3.3 illustrates the distribution between Preventive Maintenance (PM) hours and Corrective Maintenance (CM) hours for PUD's Field Maintenance Group during FY 2011, FY 2012 and FY 2013.

Figure 3.3. Preventive and Corrective Maintenance Distributions
FY 2011 through FY 2013



While preventive maintenance is typically associated with the mechanical and electrical assets found in PUD's pump stations, LPSS systems and SCADA systems, PUD also conducts preventive maintenance on gravity sewer assets. PUS has cleaned, CCTV inspected and lined 156,202 feet, or 30 miles, of pipe identified as defective within the last 3 years. At this same time, PUD CCTV inspected and cleaned 52,345 feet, or 10 miles, of gravity pipe which did not require lining.

Further, recognizing that grease blockages contribute to a large number of sewer line blockages, part of PUD's preventive focus has been on source control efforts to reduce the amount of fats, oils and grease (FOG) discharged into the sewer system. In 2008, PUD revised the County's FOG Ordinance to add total pump out and minimum pump frequency requirements. Full enforcement was implemented in January 2009.

Table 3.8 summarizes the gravity line Blockage Abatement Program activities since inception of the AOC.

Table 3.8. Blockage Abatement Program Summary

Activity	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Inspections						
Interceptors	1,581	1,714	1,733	1,668	1,510	1,197
Grease Traps	474	531	470	521	495	403
Lint Traps	64	70	68	88	78	70
Oil/Water Separators	209	231	219	55	206	180
Private Pump Stations	763	704	628	662	630	499
Shared Devices	13	12	5	13	18	6
Pending At This Time	33	32	26	17	15	8
Enforcement						
Notices of Violation (NOVs) Issued	27	65	74	32	9	0
Warnings Issued	334	140	44	136	80	70
Totals						
Total Inspections & Enforcement	3,498	3,499	3,267	3,192	3,041	2,433

The drop in the number of inspections in FY 2012 and FY 2013 is attributed to one inspector being injured and the loss of several staff to higher paying career opportunities. The one staff who was injured in early 2012 was out for an extended period of time. When returning to work, the inspector was limited to office work. This light duty status continued to limit the number of inspections PUD was able to perform.

FOG inspection staff has conducted a number of pilot tests to increase inspection efficiency. In 2009, Roverink™ electronic pen technology was evaluated. This technology allows inspectors to issue inspection reports in the field and download the completed and signed versions of the reports into CAMS once the inspector returns to the office. During the testing, 734 inspections 495 were conducted with an error rate of 2 percent. Since the inspection reports form the basis of future enforcement action, this was an unacceptably high error rate. PUD is continuing to resolve the problems with this technology.

In 2010, inspection staff completed an initial evaluation of LinkoWeb™ field communication equipment that uses a web-hosted portal to monitor the cradle-to-grave pathway of FOG wastes from Food Service Establishments (FSEs). FSE customers account for approximately 1,200 of the grease interceptors and traps regulated by the County. The program was in an early stage of development and was relatively costly. Since the grease-related SSOs attributed to FSE contributions were declining, the County decided to wait until the technology was more advanced and the cost decreased. Should the technology improve and be found to be more cost effective, PUD will re-evaluate the equipment.

During 2010, PUD also conducted field testing of In-Pipe™ chemical FOG treatments for three 90-day periods. Analyses of the laboratory results are currently underway. Changes in sampling frequencies and schedules along with operational changes during the trial period made definitive conclusions concerning the product difficult. There was a concern that influent ammonia levels were not reduced, which could impact effluent quality of the facilities that discharge to surface waters, which have stringent total nitrogen limits. The County decided not to further pursue chemical FOG treatments at this time.

Over 200 employees were trained to detect possible illegal dumping by haulers during 3-hour training sessions conducted in 2009 and 2010. Since there is no approved FOG disposal site within the County, the new full pump out requirement was expected to result in a greater temptation for haulers to discharge FOG into remote manholes rather than transport their loads out of the County. Fortunately, no major problems with illegal dumping appeared to result from the full pump out requirements.

To further control FOG once it reaches the pump stations, PUD installed Anue™ Wet Well Washers at the Nature's Way PS wet well, which had been identified as being susceptible to grease buildup. This equipment facilitates FOG, sediment and debris removal from pump station wet wells. PUD experienced some benefits of the Anue™ equipment, but the unit also released hydrogen sulfide gas and contributed to the build-up of elemental sulfur in the station. Consequently, the equipment was removed as not providing sufficient benefits to overcome the disadvantages.

In 2009, PUD also switched to Thioguard™ (magnesium hydroxide) for odor control. In addition to realizing a cost savings of approximately 30 percent, data indicated a five times reduction in hydrogen sulfide levels, which helps reduce corrosion. Another benefit of Thioguard is the reduction in head pressure in the wet well, along with a reduction of accumulated debris and grease that builds up and causes the floats to malfunction. It is believed that the Thioguard, along with the Anue well washers has contributed to SSO reductions caused by pump station mechanical failures.

Since much of the FOG contributions to the sewer system seem to be related to residential rather than commercial discharges, PUD has implemented a limited pilot program, the Cooking Oil Recycling Program (C.O.R.E.). The pilot program started in October 2012. Start-up money for the program came from in-kind penalty dollars from a consent order with FDEP. When the funding runs out, the County will need to determine how, or if, the C.O.R.E. program will go forward, especially in terms of funding. The use of C.O.R.E. cabinets as central collection centers may limit the scope and effectiveness of the program. However, with a large number of SSOs attributable to residential FOG discharges, PUD is evaluating the expansion of this program to a curbside pickup/recycling program.

After line and grease blockages, pump station electrical problems, although reduced significantly from the FY 2007 peak year, are the leading cause of SSOs. Consequently, PUD has continued to increase backup power capabilities, with an emphasis in purchasing portable high

head backup pumps. These pumps are more easily installed without waiting for specialized electricians to arrive at the site. With the backup pump capability, PUD is able to return pump stations to partial functioning condition and eliminate the SSO potential. The addition of backup power and backup pumps, combined with more stations on continuous SCADA monitoring, is expected to further contribute to reducing the number of SSOs caused by power disruptions.

PUD complies with all State of Florida requirements related to emergency pumping capability, which requires using an in-place emergency generator for “master pump stations” that either:

- Receive flow from one or more pump stations
- Discharge through force mains 12-inches in diameter or larger

Table 3.9 summarizes the number of pump stations with emergency generators and associated backup power equipment inventory statistics for since initiation of the AOC.

Table 3.9. Pump Station Backup Power Inventory Summary

Equipment Category	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Fuel Truck	1	1	1	1	1	1
Portable Fuel Tanks	14	12	12	12	12	12
Portable Generators	9	13	10	10	9	10
Portable High Head Backup Pumps	13	25	33	40	37	37
Stationary High Head Pumps	0	0	9	9	11	13
Master Pump Stations With Generators	10	10	15	15	14	15

PUD maintains close coordination with Tampa Electric Company (TECO) to ensure stations are identified on the TECO Priority List to ensure critical stations are turned to operational status as rapidly as possible. The list is reviewed annually and updated with TECO as needed. The priority list includes master pump stations as well as other stations identified as high risk stations based on having a history of SSO discharges. The 2011 TECO Priority List was included in the CTSERP submittal.

As previously indicated, the first phase of the SCADA project was completed in September 2009 and included installation of two communication towers and initial connection of 157 pump stations. Phase II of the SCADA project is underway and will include 316 pump stations. Phase III of the SCADA project will include 337 pump stations.

One lift station problem that has begun to increase in recent years is the problem of “ragging” accumulating in the wet well and building up on the pumps until the pumps are no longer able to operate. Figure 3.4 shows the material being removed from one lift station. While ragging at pump stations has always been an issue, the consistency and the frequency of the materials has changed. More plastic material is accumulating, particularly from such things as disposable “wipes” and diapers. As noted in the “Flushable bathroom wipes blamed for Tampa Bay area

sewer clogs” article, Tampa Bay Times, October 1, 2013, (<http://www.tampabay.com/news/humaninterest/flushable-bathroom-wipes-get-blame-for-sewer-clogs/2144911>) bathroom wipes are being used as a flushable alternative to toilet paper. Manufacturers insist that the clogs are made from people flushing things they shouldn’t and that wipes labeled as flushable have to pass a disintegration test. Regardless of whether these materials disintegrate or not, the plasticized material is showing up more often during both preventive and emergency wet well cleaning operations.

Figure 3.4. Pump “Ragging” Associated With “Flushable” Wipes



Understanding this problem is an industry wide public relations and education issue, PUD is currently working with the Florida Water Environmental Association (FWEA), Water Environment Federation and regional utilities to collectively create a public education and relations campaign to reduce the amount of flushable that are deposited into the sewer systems.

4 CONTINUAL IMPROVEMENT PLAN

Eliminating SSOs in a wastewater collection system is a never-ending activity. Collection system assets continue to age and deteriorate every day. Grease and debris that clogs pipes enters the system every day. Construction can occur next to buried, underground pipes at any time. All of these conditions create the potential for additional SSOs.

This section will summarize PUD's plans for continual corrective actions to further reduce the potential for SSO occurrences so that the County can achieve compliance with the Clean Water Act.

4.1 Management Ongoing Activities and Improvements

PUD management reflects the MOM Program philosophy for continual improvement. Specifically, PUD follows the following management steps:

1. Develops goals, generally in the form of performance measures such as those MOM Program performance measures listed in Appendix A.
2. Provides training to ensure staff has sufficient knowledge and resources to meet the goals, including routine quality assurance/quality control (QA/QC) checks to ensure conformity.
3. Measures progress towards the goals.
4. Reviews, and adapts procedures or activities as required, when goals are not being met.

While the actual implementation of these steps can fail, as negatively exhibited in the failure to identify the apparent non-submittal of Annual Reports under this AOC until notified by EPA Region 4; PUD remains committed to following the above steps. To correct the AOC-related deficiencies associated with failure to submit required annual reports, PUD will assign reporting responsibilities to multiple managers rather than relying on one manager to comply with regulatory requirements. Further, PUD will expand the QA/QC checking process beyond field work into regulatory-related office activities as well.

Specific to SSO control improvements, PUD staff performs a root cause analysis of each SSO event at submittal of the SSO report to check against trends that may occur across PUD's infrastructure. Starting in 2014, secondary SSO cause criterion is being applied to further "zero in" on problem areas. As the new secondary causes are beginning to be applied, team leaders will conduct monthly reviews of SSO events, cause data and trend analyses to ensure the appropriate secondary causes have been defined and are being properly applied to the SSO events. As the process continues, it is anticipated that the trend analysis reviews will continue on a quarterly basis.

PUD management intends to continue to implement the MOM Programs in accordance with best management practices typical of high performing water and wastewater utilities. PUD routinely benchmarks performance to AWWA benchmarking criteria. These benchmarking activities will continue.

Along with intensive efforts to improve operations of the sewer collection and transmission system, PUD has continued significant investment and effort throughout the other parts of the water, wastewater and reclaimed water systems. For example, PUD recently initiated a significant environmental protection project designed to reduce effluent discharges while helping to recover depleted water levels and guard against saltwater intrusion. This project recharges a stressed coastal saline aquifer with reclaimed water. Project details are summarized in the February 2014 issue of the Water Environment and Technology publication, which is attached as Appendix D to this report.

The following sections describe ongoing asset management and O&M activities.

4.2 Asset Management Ongoing Activities and Improvements

As noted in previous sections of this report, PUD has adopted an asset management-focused approach to maintain water and wastewater infrastructure. This asset management-focused approach involves:

- Asset inspection and condition assessment.
- Risk-based improvement project prioritization.
- Routine, and adequate, CIP project implementation.

The intensive AI&A inventory and condition assessment project has been completed, but routine inspection and condition assessments are continuing. PUD has initiated a contract with Layne Inliner, LLC, for continual annual inspections of the gravity sewer system. This contract includes zoom camera inspection of approximately 4,800 manholes and associated entry/exit piping. Based on the findings from the zoom camera inspection of the tributary piping, Layne Inliner will also clean and CCTV-inspect the tributary pipelines. As part of the inspection activities, asset condition assignments will be made for each asset inspected.

Pump station and LPSS system inspections are conducted as part of PUD's preventive maintenance program. Condition ratings for the various assets associated with the pump stations and LPSS systems are updated in CAMS when warranted by changing circumstances.

Force main condition changes are based on predictive life analyses completed during the AI&A Program and as updated by field findings by PUD crews.

These updated condition ratings are used to continually update and re-prioritize CIP projects. All assets in conditions 3, 4 and 5 are evaluated for inclusion in CIP projects either through PUD's annual Master Projects or through Stand-Alone Projects.

As previously described, PUD's CIP Master Projects address the ongoing annual renewal needs that require annual expenditures. The Stand-Alone projects vary from year-to-year and include the non-recurring projects and the larger projects that are too complex to be included as part of the Master Project contracting mechanisms. The Master Projects include the following categories:

- Three pump station projects (wastewater refurbishment, wastewater replacement and reclaimed water)
- Five pipeline projects (force main repair/refurbishment, manhole inspection and rehabilitation, slip-lining, LPSS system and new developments)
- One plant project (treatment plant repair/refurbishment)

PUD will continue to fund the following Master Projects that address the key collection and transmission system assets:

- Manhole Inspection & Rehabilitation Program at \$3.1 million in FY 2014 (for a \$12.2 million life to date)
- Wastewater Slip-Lining at \$2.0 million in FY 2014 (for a \$20.8 million life to date)
- Countywide Wastewater Force Main R&R at \$1.0 million in FY 2014 (for a \$4.0 million life to date)
- Countywide Major Wastewater Pump Station Refurbishment at \$2.05 million in FY 2014 (for a \$43.8 million life to date)
- Countywide Wastewater Pump Station Replacements at \$0.7 million in FY 2014 (for a \$16.2 million life to date)
- Low Pressure Sewer System at \$0.75 million in FY 2014 (for a \$14.3 million life to date)

PUD will also continue to fund Stand-Alone CIP projects as-needed basis. PUD is committed to fund needed improvements to the system and fund them appropriately, even to the extent of pursuing further bonds to ensure continuous improvement and reliability.

In addition to the recurring CIP projects that address ongoing infrastructure needs, PUD is in the process of completing several special initiatives. The major one of these special initiative CIP projects is the installation of SCADA monitoring and control equipment. As described in Section 3, Phase I of the SCADA project was completed in September 2009 and included installation of two communication towers and initial connection of 157 pump stations. Phase II of the SCADA project is currently underway and will include connection of an additional 316 pump stations with an estimated April 15, 2015, completion date. Approximately 62 of these 316 stations have

the installations completed and another 40 installations are waiting on antennae calibration. The remaining Phase II installations are scheduled to be completed by April 15, 2015. Phase III of the SCADA project will include the remaining 337 pump stations. Installation target dates have not yet been established. As new stations are added to the asset inventory, the station is either connected to an existing SCADA set up or is added to a future SCADA project phase.

4.3 Operational Ongoing Activities and Improvements

With the implementation of the CAMS and CMMS work order management systems and tools, PUD is attempting to move from a more reactive to proactive focus. Ongoing preventive maintenance activities for the key collection and transmission system infrastructure asset types are briefly described in the following subsections.

4.3.1 Gravity Sewer System Preventive Maintenance

PUD utilizes zoom camera findings to provide an indication of both manhole condition and pipeline condition for the gravity sewer system. Zoom camera inspections are generally capable of viewing 75 to 100 feet into a tributary pipe from each manhole. Since sewers experiencing a build-up of debris, FOG or other obstructions frequently show evidence of debris on the manhole bench or on the insides the pipes, zoom camera inspection can be an efficient and cost effective tool in determining whether or not a sewer requires cleaning. This allows sewer cleaning to be performed on sewers that need cleaning rather than expending time and effort on sewers that do not require routine cleaning. As previously indicated, this ongoing inspection and follow-up cleaning is being conducted under a recent contract with Layne Inliner for continual services that are expected to clean approximately 600,000 feet, or 113 miles, of sewer annually.

In addition to routine cleaning, PUD implements annual slip-lining projects under Master Projects rather than continually address debris build-up in defective pipes. The slip-lining projects correct those underlying defects and reduce the more frequent cleaning demands.

However, even with these preventive activities, PUD continues to address reactive cleaning needs. There are currently approximately 8,000 feet of gravity main "hot spots" that have been identified in the North service area that required monthly cleaning. A Benchmark work order has been established in CAMS to produce monthly work orders to ensure each of these sewers are routinely cleaned.

In addition to the preventive cleaning, PUD inspects all manholes that directly receive force main discharges on at least an annual basis to detect potential problems caused by the turbulent flow.

4.3.2 Pump Station and LPSS System Preventive Maintenance

As detailed in the CTSERP, PUD operates two categories of pump stations: Pump Stations and LPSS systems. The Pump stations are divided into five groups based on geographic regions. These regions are the Northeast, Northwest, Central, Central/South and South. Each regional

Pump Station cluster has a Field Maintenance Services Group (FMSG) team assigned for regular O&M. LPSSs are operated and maintained by a FMSG LPSS team.

Each pump station is inspected on a weekly, monthly, quarterly and annual basis, except for the LPSS stations that are on a 1-year inspection program for commercial LPSS systems and a 5-year inspection program for residential LPSS systems. SOPs have been developed that detail the inspection and the associated preventive maintenance activities for each type of pump station.

Ten percent of all pump station preventive maintenance activities are QA/QC'ed to ensure compliance with PUD's established standards.

4.3.3 Force Main Preventive Maintenance

Preventive maintenance activities related to force mains are focused on valves. All air release valves (ARVs) are part of a Benchmark work order that generates either annual or quarterly work orders for specific preventive maintenance activities such as lubrication or operational checks.

While not yet fully implemented, PUD is also developing a proactive program to address pipelines in utility easements (which tend to be force mains, but will also include gravity sewers as applicable). PUD is working with the County's Real Estate Department to clearly identify all utility easements outside of rights-of-way. These utility easements are being recorded in the County's GIS mapping database.

PUD intends to create a Benchmark work order to periodically inspect each easement for evidence of leaks, depressions or encroaching vegetation so that corrective maintenance can be performed.

5 EFFECTIVENESS ASSESSMENT

Section 5 presents an assessment of the effectiveness of PUD's actions to date.

5.1 SSO Reduction Conclusions

As noted in Section 2, SSO Summary, the following SSO causes have shown significant decreases since initiation of the AOC:

- Pump station electrical
- Pump station mechanical
- Operator errors
- TECO power-related issues
- LPSS systems

No one corrective action can be cited as being responsible for a particular reduction in SSO cause category. SSOs are not caused by single events, but rather by a complex interaction of conditions within the collection system. True SSO reduction requires a change in the managerial and operational philosophies within the utility. These philosophical changes are developed through a full adoption of the MOM Programs that leads to a gradual cultural change within the organization.

As noted in Section 4.1, Management Ongoing Activities and Improvements, PUD management has adopted a MOM Program philosophy of continuous improvement. This adoption is gradually flowing throughout the PUD organization. Examples of where these positive changes have led to SSO reduction are described in Section 5.2, Effective Corrective Action Summary. Examples of where additional change is required are described in Section 5.3, Further Corrective Action Needs.

5.2 Effective Corrective Action Summary

To fully implement recommended MOM Programs, management must be willing and able to provide O&M personnel with the budget and resources to implement the MOM Programs. PUD has demonstrated this commitment through such actions as the expenditure of funds for the Master Projects and the Stand-Alone CIP Projects detailed in this Final Report. The routine investment in annual rehabilitation and replacement of collection system assets provides a strong foundation for eliminating SSOs because the investment proactively replaces assets prior to failure.

Second, O&M personnel must be able to accomplish preventive and predictive maintenance. PUD's commitment to the CAMS and CMMS software and related asset management tools provides the mechanisms for O&M staff to identify when preventive maintenance is needed.

Combined with the investment in the AI&A Program's asset inventory and condition assessment data, O&M staff can effectively prioritize asset replacement prior to failure. This investment is not yet leading to reductions in line breaks, but has helped to reduce pump station mechanical and LPSS system problems.

The reduction in LPSS system-related SSOs is an excellent example of how managerial commitment to providing additional CIP funding combined with O&M personnel commitment to finding new and better maintenance practices jointly contributed to an extreme reduction in an SSO cause that tends to plague many utilities. The LPSS systems were largely installed under EPA's Innovative and Alternative (I&A) grant funding program and were designed to connect low density residential areas with failing septic systems. These systems had Environment One pumps that were a continual maintenance problem. The systems were spread out and difficult for maintenance staff to reach quickly especially when residents failed to call in an alarm condition. PUD was able to successfully address these issues by installing new pumps and rebuilding the electrical panels with in-house personnel and by adding GPG wireless grinder monitors and neighborhood collectors that sent remote alarms to a web-based server that can be accessed from any internet-connected computer. PUD maintenance staff is now able to receive text, phone call or pager notifications that allow them to respond to the LPSS emergency in time to prevent overflows.

In addition to PUD maintenance staff being able to respond to emergency situations promptly, PUD has been able to implement effective inter-agency cooperative actions with TECO to allow rapid restoration of power to identified priority facilities. The combination of faster PUD emergency response and the improved reliability of TECO power sources have allowed a reduction in the volume of SSO discharges.

The staff training, the stronger documented SOPs and the random QA/QC checks has also reduced the number of SSO events caused by operator-related issues. Operators are all human and humans will make mistakes, but the increased training and the well-defined procedures helps reduce the number of those mistakes and thus the number of associated SSOs.

5.3 Further Corrective Action Needs

While PUD has been able to achieve significant reductions in multiple SSO cause categories, several other categories seem to show little change. The SSO causes that continue to be of the most concern include:

- Line blockages, especially those caused by grease
- Line breaks
- Contractor hits/errors

5.3.1 Line and Grease Blockage SSO Corrective Actions

PUD has achieved some success in reducing grease blockages caused by FSE discharges through more stringent FOG Ordinance requirements, especially the requirement to perform a complete pump out of grease traps and grease interceptors. In addition to the more stringent FOG Ordinance requirements, PUD initiated extensive educational efforts to control FOG discharges at the source. Since initiation of the AOC, PUD has developed FOG educational programs designed to educate first commercial customers with grease traps and grease interceptors and then to educate general residential customers. These FOG education efforts have included, and will continue to include:

- FOG Ordinance change announcements, focusing on the complete pump out requirements
- Food service establishment (FSE) targeted FOG best management practice materials
- Residential targeted FOG brochures in English and Spanish
- FOG-related bill insert for distribution to all customers
- PUD website materials on Cooking Oil Recycling Program (CORE) and associated cabinet drop off locations

An important point to recognize in the case of FSE-related educational efforts is that such education is a never-ending activity. FSE managers and staff tend to have high turn-over both in terms of new businesses and of employees in existing businesses. Consequently, FSE education will always be needed for those new managers and staff to ensure they are aware of the operation and maintenance needs for their grease traps and interceptors.

In addition to the educational activities, PUD conducts FSE enforcement activities as detailed in Table 3.8. These FSE enforcement activities will continue with an emphasis on:

- Enforcement of complete pump out requirements
- Inspection of each regulated establishment at least twice yearly
- Interface improvements for RoverInk electronic recording of FOG field inspection activities to improve reliability and accuracy
- Investigation of upgraded LinkoWeb software tools for possible acquisition to allow cradle-to-grave pathway monitoring of FOG wastes from FSEs
- Institution of fees for FOG inspection activities
- Assessment of Sewer Lines with Rapid Assessment Tool (SL-RAT), which is an on-site field diagnostic tool utilizing acoustic sound method for possible grease/aggregate blockages in sewers

However, PUD has determined that many of the grease-related SSOs are caused not by FSE discharges, but from residential FOG discharges. SSO trend analysis has indicated an increase in grease related SSOs in the North service area, specifically around the River Oaks sewer basin.

To further control FOG-related SSOs associated with residential grease sources, PUD will target the River Oaks area under the new Layne Inliner contract for zoom camera inspection, cleaning and CCTV inspections. Based on the findings from the inspections, follow-up rehabilitation projects will be developed. In conjunction with these structural-focused activities, PUD will conduct residential FOG educational efforts to promote the CORE grease recycling program.

Since these rehabilitation and FOG control activities will take some time to reduce SSO events, PUD will also investigate the feasibility of adding two new sewer cleaning in-house teams and associated equipment during the next budget cycle to address hot spot sewer cleaning needs and prevent grease-related SSOs.

The additional in-house sewer cleaning will initially be focused on the already identified River Oaks problem area. However, PUD will also develop Benchmark work orders for sewer cleaning for any sewer collection area that has had more than one blockage during a 1-year time frame. The resulting sewer cleaning work orders will be issued on a monthly, quarterly or annual basis depending on need. PUD has estimated that these Benchmark work orders will result in approximately 50 miles of sewer cleaning on an annual basis.

To further reduce sewer blockages caused by both general debris as well as grease, PUD has decided to implement a "pop top" initiative that has proven successful in other utilities such as JEA (Jacksonville, Florida) and Little Rock Wastewater (Little Rock, Arkansas). Under this initiative O&M personnel will converge on a neighborhood and blanket inspect all manholes, checking for evidence of surcharge such as debris on the bench or grease marks above the spring line. Little Rock Wastewater has effectively targeted such inspections on "high risk" manholes that have been identified based on the size and pipe material for sewers that have experienced higher rates of historic sewer blockages and SSO events.

Finally, PUD is planning to expand educational outreach targeted to residential customers. The new educational activities being planned include:

- Educational video for the public access television channel
- Fats, oils and grease brochure
- Flushable brochure

5.3.2 Line Break SSO Corrective Actions

The line break-related SSOs includes a relatively small number of force main breaks; however, these breaks can result in large volume SSO events. To reduce the volume of such SSO

discharges, PUD is going to create Benchmark work orders to check the availability and operability of pipeline isolation valves between pump station and system force mains. The existence and operability of such isolation valves is crucial to PUD's ability to minimize "backfeed" should a tributary force main become damaged due to "hits" or material failure.

It is also expected that as more of the rehabilitation and replacement Master Projects that have been implemented in recent years, and are still being implemented, begin to finish addressing all of the condition 4 and 5 pipeline assets, the line break SSO category will begin to decrease. Hillsborough County initially created the utility department to purchase privately-owned franchise utilities located in the unincorporated areas of the county. Most of these acquired franchises had been built with materials and construction standards that do not meet PUD's current standards. Thus, it has taken significant financial resources to correct these long-standing issues. Currently there are five remaining franchises that are located in the City of Tampa, but that the Hillsborough County Commissioners are considering for future acquisition.

5.3.3 Contractor Hit SSO Corrective Actions

PUD dedicates substantial resources to ensure 811 Locates are done timely and accurately to ensure contractors performing work in the rights-of-way have accurate information to avoid hitting lines. Currently, PUD utility locaters have a 99.9 percent accuracy rate.

While PUD has had some success with reducing SSOs caused by contractor hits and errors through a damage assessment program, these contractor issues continue to be a problem. Consequently, SSO events caused by "hits" and other types of accidental damage will be targeted for additional preventive corrective action to publicize the danger and potential impacts caused by such accidental damage. PUD will work with the County's Communication office to develop a series of "news clips" that identify the dangers of unsupervised excavations and the resultant SSOs as well as the cost and the environmental impact of such SSO events. PUD will also work with local builders associations to deliver information to underground contractors that identify the dangers of unsupervised excavations and the resultant SSOs as well as the potential for increased insurance costs as a result of pipe damages. It is expected that these efforts will have limited success since many contractors consider the damage assessments from the County as essentially a normal cost of doing business.

Further, many of the "contractor hits" are caused by directional drilling contractors. Since there are no regulatory requirements for training or educational requirements to operate directional drilling equipment, many directional drill operators essentially learn on the job. The result is that many drillers do not even recognize when the equipment has hit a sewer main or lateral line.

APPENDIX A

MOM PROGRAM KEY PERFORMANCE MEASUREMENTS

MOM Program Summary. Column 1 section number references are from the MOM Program Plan for Continuous Improvement, June 4, 2010. Column 3 status summary comments are as of December 31, 2013.

MOM Program (Section #)	Key Performance Measurement	Status Summary
<p>1. Implement fully the Integrated Performance Management System (IPMS) to bolster teamwork and focus all employees on integrated goals and performance objectives/measures.</p> <p>2. Manage WRS (now PUD) Departmental operations in FY 10 to achieve compliance at or above standards for at least 75 percent of the national best practices benchmarks for utility operations, published by AWWA, and measured by WRS (now PUD).</p> <p>3. Complete a minimum of 95 percent of all performance evaluations on schedule and ensure they are processed to meet the Human Resource (HR) required completion date.</p> <p>4. Ensure all newly hired, transferred or promoted WRS (now PUD) personnel complete a "Know Your Role" form and complete National Incident Management System (NIMS) position-required training by their 9-month anniversary of employment with WRS (now PUD), or their 6-month anniversary if promoted/transferred to a new position with additional or changed requirements.</p>	<p>1. In FY 14 PUD, working with the County, implemented a new IPMS system that rates staff on individual, team and PUD Performance Measures.</p> <p>2. PUD has participated in the Florida Benchmark Consortium (FBC) and AWWA benchmarking performance indicators survey since FY 2008, and achieved the commitment to meet or surpass a minimum of 75 percent of selected indicators by averaging 87 percent from FY 2008 through FY 2012. The indicators include: water and wastewater customer accounts per employee, MGD water and wastewater delivered/processed per employee, technical quality complaints, call center abandonment rate, customer service cost per account, billing adjustments per 10,000 bills, drinking water compliance, distribution water compliance, water distribution system integrity, direct costs per MG, sewer overflow, collection system integrity, and wastewater treatment effectiveness.</p> <p>3. PUD has achieved the commitment to complete 95 percent of all performance evaluations by the HR required date .as follows: FY 08 97 percent; FY 09 95 percent; FY 10 99 percent; FY 11 99 percent; FY 12 96 percent; and FY 13 95 percent.</p> <p>4. 95 percent of PUD employees have completed Know Your Role (KYR) training, which is reviewed annually to include required NIMS ICS 100 and 700 training.</p>	<p>1. PUD has revised its training program to include: adding CEU accreditation approved by FWPCOA; publishing a yearly training calendar that meets employee personal and professional training requirements; and extensive coordination with Department leadership to ensure regulatory and compliance requirements from the state and county are met. PUD is in the process of identifying position training requirements, which will serve as a 3-year training plan for all employees.</p>
<p>1. Provide a minimum of 20 hours of job-skill enhancement or personal/professional development training for all WRS (now PUD) Department personnel each year.</p>	<p>1. Skills Training is considered part of the Technical Training performance measure, which is to provide a minimum of 20 hours of job-skill enhancement or personal/professional development training for all WRS (now PUD) Department personnel each year.</p>	<p>1. Individual training plan categories include state regulatory, county mandated, skills/tech or "craft" training and professional development or career enhancing training. To ensure staying on track to meet training goals, completed training is currently captured in the PUD's CAMS database. In 2014 training "visibility" will be enhanced when we begin implementation of the County's Oracle Learning Management system where all training requirements per employee training plans will be managed more effectively.</p>
<p>1. Safety Training is considered part of the Technical Training performance measure, which is to provide a minimum of 20 hours of job-skill enhancement or personal/professional development training for all WRS (now PUD) Department personnel each year.</p>	<p>1. Safety Training is considered part of the Technical Training performance measure, which is to provide a minimum of 20 hours of job-skill enhancement or personal/professional development training for all WRS (now PUD) Department personnel each year.</p>	<p>1. PUD has developed a sound safety training program that has witnessed renewed involvement concerning safety at all levels of leadership. This commitment has resulted in a steady decline in at-fault accidents over a 3-year period and a steady decrease in workplace injuries.</p>

MOM Program (Section #)	Key Performance Measurement	Status Summary
Safety Program (B.3)	<ol style="list-style-type: none"> 1. Reduce total at-fault vehicular/equipment accidents by 15 percent. 2. Reduce avoidable lost time injuries from unsafe acts by 15 percent. 	<ol style="list-style-type: none"> 1. PUD decreased at-fault vehicle/equipment accidents in PUD by 52 percent in past three years and was recognized by the United Safety Council for a 2013 Fleet Safety Award for outstanding driver safety performance. 2. PUD decreased workplace injuries (workers' compensation claims) in PUD by 46 percent in past three years and was the recipient of the 2012 Florida Water & Pollution Control Operators Association Safety Award for an outstanding safety program; the United Safety Council for a 2013 Corporate Safety Award for active safety program, polices and achievements; by the United Safety Council for 2013 Safety Leadership Award; and for 2013 Certified Occupational Safety Specialist Excellence Award.
Information Management Systems (B.4)	<ol style="list-style-type: none"> 1. Review asset condition codes annually to identify assets with condition code of 3 or higher and provide this information to the Engineering Services Group for development of a course of action to maintain all assets at condition code 3 or better. 2. Review ratio of corrective work versus preventive work with an eventual long term goal of 20 percent corrective work/80 percent preventive work (the expected annual goal is a 5 to 10 percent improvement). 3. Exercise the disaster recovery solution for CAMS and AIMS annually. 4. Provide the results of CAMS searches to Plant Operations and FMSG managers that identify Service Requests, Work Requests, Work Orders and Work Order Tasks that remain in an incomplete or unfinished end state for a prolonged period of time such as 90 days on a routine basis. 5. Identify CAMS Work Orders that were finished without a failure code, repair code or component code and provide results to Plant Operations and FMSG on a routine basis. 	<ol style="list-style-type: none"> 1. PUD has developed reporting tools that enable any group accessibility to condition coding reports. PUD is further enhancing these tools to include mapping capabilities and overall risk assessments for collection system assets. 2. The amount of corrective maintenance (CM) varies significantly from year-to-year depending on the number and nature of emergencies. The CM/PM percentage ratio in FY 10 was 37/63 and in FY 13 was 48/52. 3. Implemented annually. 4. Created Enterprise solution for report generation granting all users access via log-in/password. 5. These CAMS fields have been modified to required fields, which stops the task from being finished without these codes being entered.
Collection and Transmission System Plans (B.5.1)	<ol style="list-style-type: none"> 1. Update the County's HASP system to ensure that at least 85 percent of all as-built plan sheets are entered into the GIS within 30 working days of receipt of the electronic file from the developer or contractor. 2. Coordinate with the County's GIS map and database to ensure updated GPS coordinates for existing assets obtained by the Field Locate Team GPS are entered into the County's GIS system within 60 working days of receipt of the updated GPS coordinates. 3. Ensure that at least 98 percent of all infrastructure inspections of developer-installed assets are completed within two working days of request for inspection. 	<ol style="list-style-type: none"> 1. Under new SOPs, all as-built plan sheets are entered within 30 working days over 90 percent of the time. 2. Under new SOPs and GPS equipment, all data is collected and entered into the County's record systems in less than 60 working days. 3. 99 percent of developer installed infrastructure inspections are conducted within 2 working days.

MOM Program (Section #)	Key Performance Measurement	Status Summary
System Inventory (B.5.2)	<ol style="list-style-type: none"> 1. Ensure that 100 percent of all developer-donated and WRS-constructed (now PUD-constructed) project record drawing information includes a detailed asset spreadsheet that lists all required asset information for all added infrastructure. 2. Ensure that all maintenance and renovation/replacement activities for pipelines and pump stations include updates to the CAMS database for condition code changes made as part of the maintenance and renovation/replacement activity and that the observed asset-specific information is consistent with the CAMS data for those assets. 	<ol style="list-style-type: none"> 1. Asset Data Spreadsheet was simplified and scripted to aid input and to allow for more efficient data quality control, respectively. Both the Technical Manual and Specifications requires the asset submittal, or a project is not accepted by the PUD. Once approved, this information is transferred to the Planning/Records Group. 2. CAMS data is being collected and submitted at project completion. As asset data needs are being refined, information collection is being updated to meet the defined needs of the utility.
Mapping (B.5.3)	<ol style="list-style-type: none"> 1. Update the County's GIS map and database with new asset records within 30 working days of receipt of the electronic file from the developer or contractor. 2. Update the County's GIS map and database with Field Locate Team GPS coordinates within 60 working days of receipt of the updated GPS coordinates. 	<ol style="list-style-type: none"> 1. PUD's GIS team enters asset records into the Countywide GIS system within 30 days of receipt of the electronic files. The process has changed such that the electronic files is first reviewed for sufficiency by the Project Controls Team. 2. This process has been modified. The GIS team purchased the equipment to capture GPS data and is responsible for gather field data upon notification of errors in the published data. All data is entered into the Countywide system with 30 days of data capture.
Sewer System Design (B.5.4)	<ol style="list-style-type: none"> 1. Perform annual updates of the WRS (now PUD) Wastewater Master Plan and publish summary reports with a comprehensive update performed every five years. 2. Review and update the WRS (now PUD) Technical Design Standards at least once every two years to include updates on materials of construction and installation requirements. 3. Ensure 100 percent of proposed developer and County project designs meet County specifications through review checks by in-house engineering staff. 	<ol style="list-style-type: none"> 1. PUD's Planning GIS and Records Section maintains the Wastewater Master Plans. Since the economic downturn reduced growth and development pressure, the 5 year updates were delayed and smaller updates were completed. It is anticipated that a detailed wastewater master plan update will be completed in 2014. 2. Technical Design Standards were reviewed, updated and published October 2013. 3. PUD performs thorough review checks to ensure all developer and County projects meet design requirements.
New Construction and Rehab. Inspection (B.5.5)	<ol style="list-style-type: none"> 1. Ensure 100 percent of proposed projects are constructed in a manner that meets County specifications. 2. Ensure that all required inspection forms and documentation are collected and filed in the project files. 3. Ensure that at least 90 percent of all infrastructure inspections for new development are conducted within two working days of the request and that such inspections are documented. 4. Perform all warranty inspections not less than three months prior to the end of the warranty period. 	<ol style="list-style-type: none"> 1. All capital projects are built to County standards. 2. Project Managers, Design Engineers and consultants all perform and document project site inspections as necessary and required by contract/work order. 3. 100 percent of developer installed infrastructure inspections are conducted within 2 working days. 4. 100 percent of warranty inspections are conducted 3 months prior to the end of the warranty or sooner.
Acquisition Considerations (B.5.6)	<ol style="list-style-type: none"> 1. Should utility acquisition be deemed feasible in the future, ensure 100 percent of proposed acquisition projects are evaluated in a manner that clearly identifies assets not designed or constructed in a manner that meets current County specifications and details repairs necessary to bring them up to standards. 	<ol style="list-style-type: none"> 1. PUD will consider any future purchased utility as not meeting County Standards. CIP projects will be created and prioritized for repair and rehabilitation of the utility's assets.

MOM Program (Section #)	Key Performance Measurement	Status Summary
Continuous Sewer System Assessment (B.5.7)	<ol style="list-style-type: none"> Complete development of an infrastructure analysis tool utilizing the information already collected and stored in CAMS to prioritize and plan for the repair and replacement of pump stations, force mains, gravity sewers and manholes by the end of FY 11. Utilize this analysis tool to query CAMS every six months to identify assets expected to be within five years of end of useful life. Include those identified assets in the next annual CIP prioritization update schedule for either stand alone or Master Project execution. 	<ol style="list-style-type: none"> Re-design is underway to meet this performance measure by end of FY 14. Following the re-design, a separate reporting tool will be created in FY 15 to accomplish this performance measure. Currently being performed without the analysis tool, but should be automated following completion of the analysis tool.
Infrastructure Rehabilitation (B.5.8)	<ol style="list-style-type: none"> Ensure that at least 85 percent of all engineering technical reviews of wastewater pump stations to be rehabilitated are completed and pump selection recommendations are made within the required review period. Ensure that at least 85 percent of all stand alone CIPs meet or exceed their BOCC approved implementation schedules. Ensure that at least 85 percent of all annually allocated Master Project funding is spent each fiscal year. Ensure that all projects currently in or proposed for the CIP are reviewed and re-prioritized annually. Perform all warranty inspections not less than three months prior to the end of the warranty period. 	<ol style="list-style-type: none"> 100 percent of all pump station reviews and pump selections are performed in the time allowed. This goal is met. In the previous two FYs, all CIP projects were completed by the BOCC promised date. The year before that, one did not meet the date. The total percentage of spent versus allocated dollars for FY 10 through FY 13 is 95 percent. Individually the percentages are FY 10 120 percent, FY 11 190 percent, FY 12 90 percent, and FY 13 63 percent. These numbers are generated using only the Master Projects that deal with sewage programs not associated with treatment plants. This goal was met. All CIP projects are reviewed and prioritized each year. 100 percent of warranty inspections are conducted 3 months prior to the end of the warranty or sooner.
System Capacity Assurance (B.5.9)	<ol style="list-style-type: none"> Perform annual updates, with a comprehensive update every five years, of the WRS (now PUD) Wastewater Master Plan, including detailed hydraulic modeling of the force main and pump station systems, and publish summary reports, which will identify any under-performing systems that require upsizing or replacement and assure that these systems are inserted into the CIP. Ensure that at least 85 percent of all engineering technical reviews of zoning and applications for wastewater service are completed within their required review period and that all such reviews include a detailed review of system hydraulic capacity, identifying points of connection and upgrades necessary to allow the new connection. 	<ol style="list-style-type: none"> With the economic downturn and reduced development levels, the 5-year update was delayed and smaller updates were completed. It is anticipated that a detailed wastewater master plan update will be completed in 2014. Over 95 percent of engineering technical reviews and service applications are reviewed and completed on time.
Overflow Tracking (B.6)	<ol style="list-style-type: none"> Reduce the number of SSO events to a benchmark measure of less than 4 SSOs per 100 miles of sewer. Reduce the number of SSO events, excluding those events beyond the County's control, by 10 percent from previous year levels. (For example, the number of SSOs in FY 09 was 228 of which 23 percent were beyond the County's control. Thus, the FY 10 goal is 185 SSOs.) 	<ol style="list-style-type: none"> PUD is continuing to reduce SSOs, but is not yet at 4 SSOs per 100 miles. The total annual SSO reduction (not just those events beyond PUD's control) was FY 08 15.7 percent, FY 09 5.8 percent, FY 10 28.1 percent, FY 11 3.7 percent, FY 12 -10.8 percent (i.e., an increase), and FY 13 24.0 percent, for a 6-year average of 11.1 percent, which on an average basis exceeded SSO reduction performance measure.
Financial Analysis	<ol style="list-style-type: none"> Execute the WRS (now PUD) Departmental Capital Improvement Program to a standard with at least 85 percent of the approved capital projects on schedule 	<ol style="list-style-type: none"> PUD continues to meet and exceed this performance measure goal.

MOM Program (Section #)	Key Performance Measurement	Status Summary
(B.7)	<p>and within budget (excluding change orders for items that could not be reasonably foreseen) at the end of each FY.</p> <p>2. Maintain debt service coverage ratios (as defined in the Bond Resolution) and Test I at levels required to maintain credit ratings of system debt of at least "Aa/AA/AA."</p>	<p>2. PUD continues to work successfully with the Debt Management Department to coordinate the most appropriate timing for issuance of bonds for continued CIP project and R&R project funding. The most recent bond rating was upgraded by Fitch Ratings to a "AAA" in September 2012 due to "strong system management, manageable capital program, competitive and affordable rates, broad based economy and an excellent credit profile." Moody's Service maintained their current "Aa1" rating and Standard & Poor's Ratings Services maintained their "AA+" rating for the same bond offering.</p>
Equipment and Supplies (B.8)	<ol style="list-style-type: none"> 1. Maintain inventory and location accuracy in WRS' (now PUD's) warehouses above 95 percent. 2. Maintain stockage list/stocked items less than 10 percent zero balances. 3. Maintain at least 90 percent annual inventory accountability on the first pass. 4. Evaluate all vehicle related expenses and maintenance data to evaluate life cycle costs for each vehicle at 5-, 7- and 10-year milestones. 5. Consider vehicles for replacement when repairs equal one-half the purchase price. 6. Return to the dealer or have the dealer appropriately repair all "lemon" vehicles. 7. Accumulate a minimum of 7,000 miles during the FY for administrative use vehicles (e.g., couriers, engineers, supervisors, managers, administrative staff, operators and like use) and a minimum of 4,000 miles for utility trucks 1-ton and up in alignment with Fleet's use of the Mercury consultant recommendations during the FY for mission-related low density vehicles utilizing the Field Maintenance Vehicle Average Mileage Log Spreadsheet. 	<ol style="list-style-type: none"> 1. Maintained 99.90 percent accuracy for all three warehouses on the Full Monthly Inventory Audits. 2. Maintained a 2.54 percent zero issue tolerance for all three warehouses. 3. Maintained a 100 percent annual inventory accountability. 4. PUD is in compliance with this performance measure, working with Fleet Management to ensure all ongoing expenses are considered for vehicles. 5. All vehicles are considered for replacement when repairs equal 50 percent of the purchase price. Due to tight budgets in recent years, some vehicles have reached 60 percent before replacement. 6. Fleet Maintenance is in compliance with this performance measure and sends such vehicles back prior to the end of the warranty period. 7. 93 percent of vehicles are within the mileage standard (per Administrative Directive FM-08 rather than the higher standards from the Mercury Study) even through the required usages are no longer mandatory, but rather Fleet Maintenance recommendations). Based on the usages, PUD has 25 vehicles (2 sedans, 2 SUVs, 10 light trucks; 4 utility trucks; 1 cargo van and 6 dump trucks) exceeding standards
Customer Service (B.9)	<ol style="list-style-type: none"> 1. Enhance customer satisfaction survey ratings, currently at 4.0, to above 4.2 on a 5-point scale for the quality of WRS (now PUD) Department services being provided to internal and external customers at the point-of-service. 2. Provide a one-hour reaction/response time for complaints/calls that are considered WRS' (now PUD's) responsibility and for emergencies. 	<ol style="list-style-type: none"> 1. PUD stopped mailing surveys to new customers in June 2011. No decisions have been made on what questions to have on the survey. 2. The After-Hours Call Out Logs average between 8.5 to 9.5 minutes from the time the call is received until the technician is in-route.
Legal Support (B.10)	<ol style="list-style-type: none"> 1. Complete the FDEP-required Pretreatment Ongoing Local Limits study every five years to review and modify, if appropriate, discharge standards for industrial customers. 2. Review all pretreatment and connection ordinances every five years and revise as necessary. 3. Submit at least 75 percent of the required Permit Renewal Applications and Reports to the Regulatory Agencies on time. 4. Submit 95 percent of mandated Annual Reports and other documents to USEPA 	<ol style="list-style-type: none"> 1. PUD has completed FDEP-required Pretreatment Ongoing Local Limit studies on schedule, with the latest study approved by FDEP in 2013. 2. PUD completed routine reviews and last revised the ordinance in January 2013. 3. PUD is in compliance with the Permit Renewal Application and Reports performance measure. 4. PUD failed to accomplish this performance measure with this Final Report designed to correct the Annual Report submittal failure.

MOM Program (Section #)	Key Performance Measurement	Status Summary
	Region IV as required by the AOC on time.	
Water Quality Monitoring (B.11)	<ol style="list-style-type: none"> 1. Complete 97 percent of required monthly wastewater compliance testing on time. 2. Complete 97 percent of monthly wastewater operational testing on time. 3. Develop a SOP for Environmental Laboratory Special Project Requests (not of an emergency nature) to ensure such requests are appropriately budgeted and/or payment arranged, planned, scheduled and reported. 4. Respond to requests for assistance related to special requests for laboratory testing and analysis within five business days at least 95 percent of the time. 5. Respond to field requests for assistance related to Environmental Monitoring/Industrial Pretreatment/FOG issues within five business days at least 95 percent of the time. 	<ol style="list-style-type: none"> 1. PUD is in compliance with the monthly wastewater compliance testing performance measure. 2. PUD is in compliance with the monthly wastewater operational testing performance measure. 3. The SOP was developed and PUD is in compliance with this performance measure. 4. PUD is in compliance with the laboratory testing and analysis performance measure. 5. PUD is in compliance with the Environmental Monitoring/Industrial Pretreatment/FOG performance measure.
Contingency Plan for Utility Infrastructure (B.12)	<ol style="list-style-type: none"> 1. Restore system integrity for at least 85 percent of wastewater infrastructure assets disabled by minor emergency conditions to operational condition within two working days of the notice that it is safe for personnel to return to the damaged areas of the County. 2. Restore system integrity for 98 percent of wastewater infrastructure assets disabled by minor emergency conditions to operational condition within seven working days of the notice that it is safe for personnel to return to the damaged areas of the County. 3. Ensure all newly hired, transferred or promoted WRS (now PUD) personnel complete a "Know Your Role" form and complete National Incident Management System (NIMS) position-required training by their 9-month anniversary of employment with WRS (now PUD), or their 6-month anniversary if promoted/transferred to a new position with additional or changed requirements. 	<ol style="list-style-type: none"> 1. PUD has not experienced any wide-spread outages since initiation of the AO with EPA Region 4. 2. PUD maintains the system at over 99 percent mission ready status with only an occasional repair lasting more than 12 hours. During these > 12-hour repairs, plans are instituted to ensure operational services are continued with little to no customer impact. 3. 95 percent of PUD employees have completed Know Your Role (KYR) training, which is reviewed annually to include required NIMS ICS 100 and 700 training. 93 percent of PUD employees have a KYR on file. The remainder will be updated during the March 2014 update process.
Pump Station Preventive Operations (C.1.1 & 3.2)	<ol style="list-style-type: none"> 1. Reduce downtime caused by non-storm related electrical power outages at WRS' (now PUD's) treatment plants and pump stations by increasing the percentage of mitigation from 14 percent experienced in FY 04 to 20 percent by FY 10. 2. (Also see performance measures related to Information Management Systems, Collection and Transmission System Plans, System Inventory, Continuous Sewer System Assessment, Overflow Tracking, Equipment and Supplies, and Corrosion Control Programs.) 	<ol style="list-style-type: none"> 1. In order to ensure that both the Water and Wastewater facilities continue to operate during electrical power outages, PUD identified redundant power sources. A 24-hour test was performed at for the treatment processes at the Water and Wastewater facilities in FY 12 and FY 13 to confirm equipment reliability for a sustained period of time. A similar 24 hour test period is planned in FY 14. 2. Plant Operations Group is conducting energy audits and is investigating software that will monitor large energy consumption equipment to evaluate and reduce non-essential electric power consumption.
Pump Station Reactive Operations	<ol style="list-style-type: none"> 1. Provide a minimum of a 1-hour response time from initial problem report to WRS (now PUD) emergency personnel arriving on site. 2. Provide a minimum of a 2-hour response time from WRS (now PUD) emergency 	<ol style="list-style-type: none"> 1. PUD currently maintains coverage 24/7 for all areas, including LPSS systems. PUD maintain 4 on call mechanics , 3 on call electricians plus 2 electronic technicians to support the electricians. SCADA has been installed on 1,050

MOM Program (Section #)	Key Performance Measurement	Status Summary
(C.1.2 & 3.2)	personnel arriving on site to restoration of normal operations.	<p>individual LPSS units and receives direct calls for station alerts enabling PUD to immediately dispatch repair personnel. The After-Hours Call Out Logs average between 8.5 to 9.5 minutes from the time the call is received until the technician is enroute.</p> <p>2. Once the technician arrives at the site, the complexity of the situation dictates the restoration of normal operations. Situations such as a major force main break or a catastrophic pump station failure, a return to normal operations will extend beyond the 2-hour performance measure; however, under more typical situations, PUD is able to restore normal operations in less than 2 hours because the first responder is always an electrician whom maintains major repair components on his/her vehicle to expedite repair actions. PUD has learned that having an electrician as first responder decreases the time required to restore normal operations for emergency calls.</p>
Pretreatment (C.2)	<ol style="list-style-type: none"> 1. Inspect 100 percent of users a minimum of twice a year to ascertain whether persons or occupants of the premises where wastewater is created or discharged are permitted and in compliance with the requirements of their permit. 2. Review 100 percent of the results of monitoring samples of users a minimum of monthly as part of permit conditions reported to WRS (now PUD) to ensure compliance with the user's permit. 3. Notify 100 percent of the users violating the permit conditions of any specific violation identified through either the monthly monitoring or the semi-annual inspections to help the user return to compliance. 4. Respond to field requests for assistance related to Environmental Monitoring/Industrial Pretreatment/FOG issues within five business days at least 95 percent of the time. 5. Complete 95 percent of Industrial Pretreatment Team activities, including the required Annual Pretreatment Report and Permittee inspections and audits as required by FDEP, individual permits and the Industrial Pretreatment Team schedule on time. 	<ol style="list-style-type: none"> 1. PUD has generally been in compliance with this performance measurement, with an audit and sampling inspection conducted annually for all permitted industries; "no discharge" industries are audited annually. A few industries were not audited in CY 13 due to a revised inspection schedule approved by FDEP. The schedule has since been modified to ensure all industrial users will be audited annually. 2. PUD is in compliance with the monitoring samples performance measure. 3. PUD is in compliance with the NOV performance measure. 4. PUD is in compliance with the field requests for assistance performance measure. 5. PUD is in compliance with the Industrial Pretreatment Team activities performance measure.
Corrosion Control (C.3)	<ol style="list-style-type: none"> 1. Resolve odor complaints within five working days under routine conditions while continuing to reduce levels of gaseous H₂S (hydrogen sulfide) in liquid and vapor phase in the system. 2. Reduce the cost of odor and corrosion control methods for the WRS' (now PUD's) wastewater treatment plants, pump station facilities and line infrastructure through research and development of various vendors, products and methods of odor and corrosion control. 3. Annually inspect all manholes that receive force main discharges to detect surface corrosion rates and identify manholes to be rehabilitated under 	<ol style="list-style-type: none"> 1. PUD responds immediately on a 24/7 basis to all odor complaints when received using on call staff and two contractors. While investigating the complaint, PUD tries to identify the cause of the odor. If a complaint relates to an existing odor control unit that requires parts to repair the malfunctioning equipment, there may be a longer lead time until the repairs are complete. The sewer system is treated with Thioguard at specific sites located throughout the county to help keep the levels of H₂S down and suspended in the liquid, which in return reduces the size of the vapor phase and carbon absorber units needed to polish off remaining H₂S gas.

MOM Program (Section #)	Key Performance Measurement	Status Summary
	WRS (now PUD's) WORCS contract.	<p>2. PUD constantly re-evaluates odor control process and the applications used to treat unwanted odors to apply the best odor treatment possible at specific sites. PUD investigates new vendors, the latest odor control treatment processes, and conducts trial runs as appropriate. One example of a cost reduction product is the switch from Bioxide to Thioguard in the liquid phase treatment process. Since 2009, the liquid phase treatment process cost was reduced to achieve current average savings of \$600,000.00 a year.</p> <p>3. Scheduled 163 manhole inspections for manholes that receive force main discharges in FY 13 and completed 161. Two inspections where cancelled due to other maintenance activities.</p>
Fats, Oils and Grease Control (C.4 & 3.1)	<p>1. Achieve a 92 percent regulated industry compliance level through proactive education and routine communications during inspection visits.</p> <p>2. Reduce the annual number of SSOs, excluding those events beyond County control in the reporting period, 10 percent from the previous year's number. (For example, the FY 08 SSO number was 223 of which 23 percent of were considered beyond County control. Thus the goal for FY 09 is 185 SSOs.)</p>	<p>1. The compliance rate measure by the number of inspections and the number of warning letters and NOV's issued has been at least 94 percent from FY 09 to FY 12.</p> <p>2. The total annual SSO reduction (not just those events beyond PUD's control) was FY 08 15.7 percent, FY 09 5.8 percent, FY 10 28.1 percent, FY 11 3.7 percent, FY 12 -10.8 percent (i.e., an increase), and FY 13 24.0 percent, for a 6-year average of 11.1 percent, which on an average basis exceeded SSO reduction performance measure.</p>
Service Connection/ Disconnection (C.5)	<p>1. Connect the service connection within ten working days of the customer's request.</p> <p>2. Disconnect the service connection, in a manner that prevents entry of extraneous water to the system, within ten working days of the Customer Service staff's request.</p>	<p>1. After a customer request a connection and has paid their fee, a field activity is created and turned to a work order the same day. The work order average days to connect is 1 day.</p> <p>2. Once the customer has been identified for non payment a work order is created and same day plug or replug action is accomplished. As priority field activities, the on-call or late shift personnel complete the work order if the customer service group is unable to complete the work order that day.</p>
Private Haulers (C.6)	WRS (now PUD) does not accept discharges from private haulers other than contracted support. Contracted support are vendors that are under a WRS (now PUD) contract and must return the wastewater to the same system from which it was removed.	Not applicable.
Line Location (C.7)	<p>1. Complete at least 90 percent of the SSOCOF (e.g., Sunshine) tickets within the required time period.</p> <p>2. Ensure that at least 85 percent of all requested field locates are conducted within two days of request.</p> <p>3. Ensure that at least 85 percent of all record and utility coordination requests are completed within their respective timelines (FDOT = 30 days; Public Works = 10 days; Development Review = 3 days; Other Utilities = 7 days).</p>	<p>1. 99 percent of the SSOCOF tickets are completed within the required time.</p> <p>2. 99 percent of the field locates are completed within 2 working days.</p> <p>3. 95 percent of the utility coordination requests are completed within the performance measure times.</p> <p>4. PUD continues to coordinate with the County Attorney's Office to define additional measures needed to improve the billing collection rate from contractors damaging the County's infrastructure facilities.</p>
Pump Station Repair	1. Issue work orders to proactively inspect each residential LPSS unit at least once	1. Annual inspections for 213 commercial scheduled inspections were completed. 5-year inspections for 228 residential inspections where scheduled, with 226

MOM Program (Section #)	Key Performance Measurement	Status Summary
(D.1.1, 3.2 & 4.2)	<p>every five years and each commercial LPSS unit annually.</p> <ol style="list-style-type: none"> Issue work orders to proactively inspect each PS a minimum of weekly. Issue work orders to perform QA/QC on at least 10 percent of the pump stations that were checked the week before to ensure operational readiness (rotating through the set number of stations so that every station has a QA/QC check every 10 weeks) Issue work orders to repair problems discovered during the LPSS/PS inspections within one working day of the discovery of the problem. Ensure that no more than 5 percent of the work orders are delinquent at any given time. 	<p>completed and 2 cancelled.</p> <ol style="list-style-type: none"> Weekly PS inspections totalling 36,999 inspections were scheduled and completed in FY 13. Supervisor QA checks totalling 1,259 checks were scheduled and completed in FY 13. All defects are immediately repaired unless they are too extensive and then a work order is made by mechanic at shifts end. PUD is in compliance with this performance measure goal.
Electrical Maintenance (D.1.2, 3.2 & 4.2)	<ol style="list-style-type: none"> Reduce downtime caused by electrical power outages at County water and sewer treatment plants and pumping facilities by increasing the percentage of mitigation from 14 percent experienced in FY 04 to 20 percent by FY 10 (mitigation of power outages progressively calculated by year from FY 04 baseline for non-storm and storm categories). Reduce electrical consumption/costs from all sources by at least 15 percent in plant, shop/warehouse, pump stations and administrative use facilities from FY 09 consumption/cost levels. Reclassify electrical positions from "residential" to "commercial". 	<ol style="list-style-type: none"> In partnership with local utilities and through facility upgrades, reduced downtime caused by electrical power outages were reduced an average of 58 percent from FY04 through FY10. Although PUD has added over 80 new structures to inventory, and TECO has implemented two base rate increases, PUD has continued to reduce energy costs by \$1.6 million and consumption by 22 percent from FY 09 to FY 13 by the following: <ol style="list-style-type: none"> Established the County's first Energy Management Team (PUD department team) which increases the awareness of energy conservation throughout the department. Partnered with TECO to perform 14 detailed energy audits at our plants and large office locations, and completing many of the recommendations from the audits that reduced consumption such as, lighting retrofits, reduction of electrical equipment, purchase of more energy efficient motors, etc. Established the PUD Strategic Energy Plan that details goals and plans for reducing our energy consumption department-wide. Participated in the TECO Stand By Generator program that provides a \$150,000 credit annually and documents usage of generators for testing, maintenance and emergency situations. Continued education of staff for energy awareness and knowledge regarding energy conservation methods. All electrical and mechanical positions have been reclassified as Electrician Intermediate level and Journeyman level; and as Mechanical entry level, intermediate level and journeyman level.
Mechanical Maintenance (D.1.3, 3.2 & 4.2)	<ol style="list-style-type: none"> Attain a pump shop pump return to service rating exceeding the FY 09 annual average of 30.2 pumps per month by 20 percent. 	<ol style="list-style-type: none"> For FY 11, based on average of 5 employees, the average quota for the year was 34 pumps and an average return to service was 36. For FY 12, based on an average of 7 employees, the average quota for the year was 26 pumps and an

MOM Program (Section #)	Key Performance Measurement	Status Summary
4.2)		average return to service was 33. For FY 13, based on an average 7 employees the average quota for the year was 23 pumps and an average return to service was 34.
Physical Maintenance (D.4.1.4, 3.2 & 4.2)	<ol style="list-style-type: none"> 1. Resolve routine cleanup and minor repairs discovered during the weekly PS physical inspections during the site visit. 2. Issue work orders to repair more extensive problems discovered during the weekly PS physical inspections within one working day of the discovery of the problem with corrective action to be completed within two working days of issuance of the work order. 3. Ensure that no more than 5 percent of the work orders are delinquent at any given time. 	<ol style="list-style-type: none"> 1. All minor discrepancies are cleared on the spot during maintenance personnel's site visits. 2. Any major repair problem that may affect the operational condition of a pump station is given priority attention with work orders immediately written to facilitate repair actions. 3. All work orders are routed to the area Utilities Maintenance Supervisor who issues the work order to the appropriate technician. Supervisors monitor work order completions to ensure expeditious completion.
Routine Hydraulic Cleaning (D.2.1 & 4.1)	<ol style="list-style-type: none"> 1. Issue work orders to proactively inspect, and clean if required, a minimum of 10 percent of the collection system annually beginning in FY 12 (initial inspections will be performed using Zoom cameras with subsequent CCTV of the pipe segments based on Zoom camera results). 2. Issue work orders to clean sewers discovered to have blockages within one working day of the discovery of a partial blockage and immediately upon the discovery of a complete blockage. 3. Ensure that no more than 5 percent of the work orders are delinquent at any given time. 	<ol style="list-style-type: none"> 1. The Field Maintenance Section (FMS) instituted a proactive cleaning program in the North service area portion of the County in response to the grease-related SSOs. The FMS has scheduled approximately 8,000 feet of gravity sewer to be cleaned on a monthly basis. The County has recently approved a new \$7.7 million slip lining and cleaning contract for FY 14 with an estimated 231,000 feet (approximately 44 miles) of gravity sewer to be cleaned and lined during a 15-month period. This contract has provisions for both hydraulic and mechanical cleaning on an as-needed basis. 2. The Utility Maintenance Supervisor (UMS) creates a work order for monthly cleaning, but a benchmark work order is under preparatory to automatically generate monthly tasks. 3. All blockages are immediately cleared and cleaned while the crews are on site and a work order is generated at the end of the shift to capture the cleaning time and for historical documentation. There are no delinquent work orders for identified blockages as they are cleaned on site.
Routine Mechanical Cleaning (D.2.2 & 4.1)	<ol style="list-style-type: none"> 1. Issue a work order to a contractor for mechanical cleaning of any sewer line where hydraulic cleaning is determined to be ineffective within 10 working days of the hydraulic cleaning attempt. 2. Ensure that no more than 5 percent of the work orders are delinquent at any given time. 	<ol style="list-style-type: none"> 1. Mechanical cleaning is rarely required because hydraulic cleaning is usually effective, but when required, a Notice to Proceed is issued to a contractor to perform the work within 10 working days. 2. There are no delinquent work orders for mechanical cleaning.
Root Control (D.2.3 & 4.1)	<ol style="list-style-type: none"> 1. Issue a work order to a contractor for chemical root control of any sewer line identified as having medium or heavy root buildup within ten working days of the identification. 	<ol style="list-style-type: none"> 1. PUD does not have a major problem with root control within the gravity sewers. Most of the root problems have been with laterals on the right-of-way or customer property. If on the right-of-way, PUD normally removes and replaces the lateral pipe as needed. The County's WORCS contract is used when the lateral is over 10-feet deep; otherwise, PUD crews replace the pipe. When a WORCS contractor is needed, they are immediately notified and work normally commences within 1 to 2 days depending on the severity of the situation.

MOM Program (Section #)	Key Performance Measurement	Status Summary
Manhole Preventive Maintenance (D.2.4 & 4.1)	<ol style="list-style-type: none"> 1. Issue work orders to proactively inspect a minimum of 10 percent of the collection system manholes annually beginning in FY 12 (using Zoom cameras technology). 2. Issue a work order for the appropriate corrective actions as determined by the inspection within 10 working days of receipt of the inspection report. 3. Ensure that no more than 5 percent of the work orders are delinquent at any given time. 	<ol style="list-style-type: none"> 1. PUD currently annually inspections 163 manholes that directly receive force main flows to detect possible damage due to H₂S. 2. All minor repairs are completed as part of the inspection. If a work order is required, it is created and issued immediately to have a WORCS contractor repair the manhole as scheduling permits. If a manhole is determined to be a safety issue, the manhole is declared an emergency and repairs are instituted immediately. 3. There are no delinquent work orders for inspection or follow-up corrective actions.
Air Valve Preventive Maintenance (D.3)	<ol style="list-style-type: none"> 1. Perform quarterly PS Preventive Maintenance checks to identify system pressures higher than nominal and issue a corrective action work order to inspect, and repair as needed, all air valves on the force main serving that station within one working day of the discovery of higher pressures. 	<ol style="list-style-type: none"> 1. Performed 842 annual PMs and 73 quarterly PMs on force main ARVs. The quarterly PMs are due to identified high maintenance areas.
Maintenance of Rights-of-Way and Easements (D.4.1)	<ol style="list-style-type: none"> 1. Inspect and clear 100 percent of off-road rights-of-way and easements as problems are detected. 2. Review ownership of off-road rights-of-way and easements and develop a plan for periodic maintenance clearing of any rights-of-way or easements not already periodically maintained. 	<ol style="list-style-type: none"> 1. PUD has a GIS inventory of all County water and wastewater pipe systems. Pipes in the right-of-way are identified in GIS and routine maintenance is conducted in coordination with the County's Public Works Department to include when obstructions are identified. 2. PUD is identifying PUD's easements and developing a GIS inventory and database. Once completed, a periodic inspection and maintenance schedule will be implemented.
Street Paving Monitoring (D.4.2)	<ol style="list-style-type: none"> 1. Raise a minimum of 80 percent of the annual number of manholes and valve vaults raised in a proactive basis prior to, or during, street paving operations. 2. Ensure the reactive work orders issued to uncover manholes or valve vaults that have been buried do not exceed 20 percent of the annual number of manholes and valve vaults requiring rising. 	<ol style="list-style-type: none"> 1. PUD is in compliance with the manhole/valve vault performance measure goal. 2. PUD is in compliance with the manhole/valve vault work order performance measure goal.
Reactive Maintenance (D.5)	<ol style="list-style-type: none"> 1. Respond within one hour from receipt of the initial problem report to WRS (now PUD) emergency personnel arriving on site. 2. Depending on the complexity of the problem the time may vary, but in general, respond within two hours from WRS (now PUD) emergency personnel arriving on site to restoration of normal operations. 3. Forward a minimum of 85 percent of the emergency responses requiring follow-up maintenance work orders to applicable O&M staff within 10 working days. 4. Ensure that no more than 5 percent of the work orders are delinquent at any one time. 	<ol style="list-style-type: none"> 1. PUD is in compliance with the emergency response performance measure goal. 2. PUD is in compliance with the restoration of operations performance measure goal. 3. PUD is in compliance with the follow-up maintenance work order performance measure goal. 4. PUD is in compliance with the delinquent work order performance measure goal.

APPENDIX B

***WASTEWATER AND RECLAIMED WATER PROJECTS DELIVERED
FY 2008 THROUGH FY 2013***

CIP #	Stand-Alone CIP Projects	Area	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Project Type
10127	Boyette 20" Force Main TECO/Balm River Road	WW	9,625,000	0	0	0	0	0	Pipeline
10759	Northwest Class A Sludge Processing Facility	WW	29,850,000	0	0	0	0	0	Plant
10770	Brandon Lakes Force Main Replacement	WW	700,000	0	0	0	0	0	Pipeline
10774	River Oaks Switchgear Replacement	WW	1,353,202	0	0	0	0	0	Plant
10777	US 41 Symmes Avenue Wastewater Force Main	WW	2,477,000	0	0	0	0	0	Pipeline
10782	Carrallwood / Dale Mabry RW Pump Station	RW	5,000,000	0	0	0	0	0	Pump Station
10790	Comanche Avenue Partial Force Main Replacement	WW	1,242,749	0	0	0	0	0	Pipeline
10792	River Oaks AWTP - Power Distribution Rehabilitation	WW	1,000,000	0	0	0	0	0	Plant
10793	Tanglewood Pump Station Replacement	WW	1,100,000	0	0	0	0	0	Pump Station
10799	Cheval East Bordeaux RWIU	RW	713,000	0	0	0	0	0	Pipeline
10148	Falkenburg AWTP Alternate Power Supply	WW	0	1,000,000	0	0	0	0	Plant
10642	Large Diameter Force Main Valve Installation	WW	0	2,000,000	0	0	0	0	Pipeline
10643	River Oaks RAS Pump Replacement	WW	0	2,100,000	0	0	0	0	Plant
10645	Lumsden Trace RWIU	RW	0	425,000	0	0	0	0	Pipeline
10769	NWRWRF Plant Expansion	WW	0	65,000,000	0	0	0	0	Plant
10771	Chelsea Pump Station Replacement	WW	0	915,000	0	0	0	0	Pump Station
10772	Falkenburg Plant Expansion	WW	0	31,717,003	0	0	0	0	Plant
10778	Valrico AWTP UV Disinfection	WW	0	7,640,000	0	0	0	0	Plant
10784	Falkenburg UV Disinfection	WW	0	7,640,000	0	0	0	0	Plant
19016	Valrico AWTP Expansion	WW	0	62,000,000	0	0	0	0	Plant
19125	Countywide Wastewater Pump Stations (SCADA)	WW	0	7,455,770	0	0	0	0	Pump Station
10145	State Road 674 Force Main	WW	0	0	4,800,000	0	0	0	Pipeline
10147	NWRRMF Barscreen Replacement	WW	0	0	2,525,000	0	0	0	Plant
10154	Balm Riverview Force Main (Big Bend Road)	WW	0	0	2,495,000	0	0	0	Pipeline
10174	Sugarmill WWPS Replacement/Rehabilitation	WW	0	0	575,000	0	0	0	Pump Station
10641	Armand Drive Gravity Sewer (PS Replacement)	WW	0	0	950,000	0	0	0	Pipeline
10144	CR 672 Force Main (Balm Riverview Rd. to SR 301)	WW	0	0	13,000,000	0	0	0	Pump Station
10150	Symmes Road WW Pump Station	WW	0	0	1,648,000	0	0	0	Pipeline
10158	Nature's Way WW Pump Station Upgrade	WW	0	0	5,000,000	0	0	0	Pump Station
10193	Van Dyke WWTP Clarifier & Aerator Rehabilitation	WW	0	0	2,900,000	0	0	0	Plant
10194	Clay Avenue Master WWPS Rehabilitation	WW	0	0	1,500,000	0	0	0	Pump Station
10195	Chemical Feed Systems Rehabilitation	WW	0	0	1,707,791	0	0	0	Plant
10149	Big Bend Road WW Pump Station	WW	0	0	0	2,779,203	0	0	Pump Station
10163	Crosby Road Reclaimed Water Transmission Main	RW	0	0	0	3,717,000	0	0	Pipeline
10172	Dale Mabry AWTP Filter Feed Screw Pump Rehabilitation	WW	0	0	0	849,025	0	0	Plant
10175	Dawnview Wastewater Pump Station Replacement / Rehab	WW	0	0	0	1,229,199	0	0	Pump Station

CIP #	Stand-Alone CIP Projects Continued	Area	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Project Type
10176	Comanche Ave Wastewater Pump Station Replacement / Rehab	WW	0	0	0	0	750,000	0	Pump Station
10196	South County AWTP Sludge Processing Conversion	WW	0	0	0	0	3,319,652	0	Plant
10197	Golf And Sea WWPS'S #1 & #2 (Conversion To Gravity Sewer)	WW	0	0	0	0	1,518,841	0	Pipeline
10214	Falkenburg AWTP Effluent Pumps Replacement	WW	0	0	0	0	1,075,000	0	Plant
10152	US 301 Force Main (Valencia Lakes to SR 674)	WW	0	0	0	0	0	2,953,116	Pipeline
10167	Falkenburg AWTP Sludge Dewatering Upgrade	WW	0	0	0	0	0	4,733,778	Plant
10169	Memorial Highway Force Main Replacement	WW	0	0	0	0	0	3,206,462	Pipeline
10170	NW Biosolids Gravity Belt Thickener Rehabilitation	WW	0	0	0	0	0	697,145	Plant

Stand-Alone CIP Totals \$53,060,951 \$187,892,773 \$11,345,000 \$25,755,791 \$15,237,920 \$11,590,501 **Grand Total** \$304,882,936

CIP #	Master Projects							Area	FY08	FY09	FY10	FY11	FY12	FY13	Project Type	
10138	Countywide Major Wastewater Pump Station Refurbish (Master Project)								WW	3,623,374	4,292,688	3,234,810	4,163,103	5,001,514	5,150,373	Pump Stations
10140	Countywide Wastewater Pump Station Replacements (Master Project)								WW	1,518,720	1,582,992	1,912,549	1,008,967	572,159	832,985	Pump Stations
10171	Countywide Wastewater Force Main R&R (Master Project)								WW	0	0	81,805	993,450	250,922	703,662	Pipeline
10744	Manhole Inspection & Rehabilitation Program (Master Project)								WW	142,126	262,965	86,770	1,828,935	289,687	40,559	Pipeline
10745	Regional Wastewater Treatment Plant R&R - (Master Project)								WW	3,283,788	4,311,692	2,061,330	2,402,736	3,792,649	1,932,483	Plant
10750	Wastewater Slip-Lining (Master Project)								WW	1,196,976	1,344,967	25,017	23,742	2,733,583	1,171,780	Pipeline
10768	Low Pressure Sewer System - (Master Project)								WW	1,428,675	1,044,164	669,708	997,276	1,541,758	1,342,415	Pipeline
10795	Reclaimed Water Pump Station Refurbishment (Master Project)								RW	138,221	78,811	41,077	52,683	248,274	348,861	Pump Stations
19017	RWTM Extensions To New Developments & RWIUs (Master Project)								RW	85,097	481,286	103,903	21,781	244	10,509	Pipeline

Master Project CIP Totals \$11,416,977 \$13,399,565 \$8,216,969 \$11,492,673 \$14,430,790 \$11,533,627 **Grand Total** \$70,490,601

Grand Total (All Projects) \$64,477,928 \$201,292,338 \$19,561,969 \$37,248,464 \$29,668,710 \$23,124,128 \$375,373,537

APPENDIX C

FITCH RATINGS SEPTEMBER 2012 BOND RATING UPGRADE

FITCH UPGRADES HILLSBOROUGH COUNTY, FL UTILITY SYSTEM REVS TO 'AAA'; OUTLOOK STABLE

Fitch Ratings-New York-06 September 2012: Fitch Ratings takes the following action on Hillsborough County, Florida:

--Approximately \$196 million water and wastewater utility system revenue bonds upgraded to 'AAA' from 'AA+';

The Rating Outlook is Stable.

SECURITY

The bonds are secured by a senior lien pledge of the net revenues of the county's water and wastewater system, including pledged capacity fees, proceeds from the sale of property, property and casualty insurance proceeds, qualified derivative receipts and federal direct payments received by the county.

KEY RATING DRIVERS

STRONG SYSTEM MANAGEMENT: The rating upgrade reflects the system's strong and conservative financial management, demonstrated by low debt levels, cash-funding of capital needs, solid annual financial margins and cash flows, and strong debt service coverage and liquidity.

VERY LOW DEBT BURDEN: The debt burden is well below average at 23% of net assets, and \$700 per customer, and debt carrying charges are a very manageable 10% of gross revenues. Annual debt service is expected to decline further in 2016 with scheduled maturity of the series 2001 bonds.

MANAGEABLE CAPITAL PROGRAM: Capital needs are a manageable \$250 million over the next five years. With about \$60 million in excess annual cash flows expected from operations, the county anticipates cash-funding all of the proposed capital projects, allowing debt ratios to decline further. In addition, the county has over \$30 million in available renewal and replacement funds to be used towards system maintenance.

COMPETITIVE AND AFFORDABLE RATES: Rates are in line with neighboring systems and remain an affordable 1.8% of median household income. Rates are expected to remain competitive with annual increases designed to keep pace with inflation. A pass-through mechanism for purchased water costs from Tampa Bay Water (TBW) is viewed favorably by Fitch.

BROAD-BASED ECONOMY: The county serves as the economic hub for Florida's central Gulf Coast, with major sectors in business services, government, healthcare, education, and tourism. Recent employment gains have lowered the unemployment rate (9.4% in July 2012), and rising sales and tourist-related taxes are indicative of economic recovery. However, the unemployment rate remains elevated and housing weakness remains, but is offset by a stable customer base, and low bad debt write-offs.

CREDIT PROFILE

STRONG SYSTEM MANAGEMENT PROVIDES BASIS FOR RATING UPGRADE

Hillsborough County (general obligation bonds rated 'AAA' by Fitch) owns and operates a water and sewer system (the system) that services approximately 500,000 residents located in the unincorporated areas of the county. The system served over 144,000 mostly residential water accounts and roughly 134,000 sewer accounts in fiscal 2011. The county, located on central

The system, which is an enterprise fund of the county, is well managed, evidenced by its strong financial cash flows and coverage of debt service, very high liquidity levels despite significant historical cash-funding of capital needs, and very low debt burden.

System financial performance has been strong historically despite recessionary pressures and a regional drought in 2008-2009. The system maintained sound financial metrics with over 2.0x coverage of debt service (excluding connection fees), and very sizable unrestricted cash balances of \$165 million in 2009, which was equivalent to 469 days of cash on hand.

An increase in demand coupled with modest rate increase in fiscals 2010 and 2011 improved already solid financial margins. The system ended fiscal 2010 with about 3.0x coverage of debt service, and a slightly larger liquidity position, and by fiscal 2011 the system recorded roughly 3.7x coverage of debt service, and cash and cash equivalents totaling over 600 days of operations.

CASH FUNDED CAPITAL A CREDIT STRENGTH

Significant investment in the system has been accomplished mainly with cash resources. Since fiscal 2007, the system has invested over \$400 million in capital assets, while debt issuance has been kept to a minimum. As of fiscal end 2011, the system had just \$196 million in total outstanding bonds, which has led to well below average debt ratios. Debt is just 23% of net assets, \$700 per customer, and a very low 0.6% of system equity. No new debt is expected over the intermediate term.

SYSTEM CAPACITY IS SOLID, LIMITING FUTURE CAPITAL NEEDS

The system owns and operates four geographically dispersed water treatment plants with a total treatment capacity of 121.1 mgd, which is more than 2x the average daily demand. The county's seven advance wastewater treatment facilities are also dispersed and maintain sound capacity with utilization of 63% in 2011 (utilization measured as the system's average daily flow divided by total treatment capacity from all plants). A 5.5 mgd expansion to the South County plant in 2014 will further improve utilization.

Capital needs are manageable and include various system renewal, rehabilitation and upgrades totaling \$250 million over the next five years. Management does not expect to issue additional bonds. Instead the system will rely on existing cash, sizable expected excess annual cash flows and other sources (impact fees and grants) to fund its capital needs.

OUTSOURCED SUPPLY IS RELIABLE AND AMPLE, LIMITS EXPOSURE

The county's water is supplied by TBW, a highly-rated special district created by inter-local agreement to plan, develop, and deliver a high-quality water supply to the region. TBW, which is rated 'AA+' with a Stable Outlook by Fitch, provides water to the county and five regional municipal systems including such highly rated entities as Pinellas County (sewer system rated 'AA'), Pasco County ('AA' rated water and sewer system), and the cities of Tampa ('AA+' water and sewer system), St. Petersburg ('AA' rated system), and New Port Richey.

The county received 50.6 MGD, or about 30% of TBW's total 2011 production of 161 MGD, and remains one of TBW's largest customers (just behind Pinellas County). TBW maintains significant and diverse raw water resources that include various surface water sources and groundwater wells totaling as much as 240 million gallons per day (mgd). TBW is obligated to provide 100% of the water supply needs to the member governments. Members make several, not joint, payments to TBW as an operating expense of their respective utility systems.

RETAIL RATES REMAIN MANAGEABLE AND INCLUDE A TBW PASS-THROUGH

Rates are set by the county independent from regulatory or other outside influence, and are designed to recover the fixed and variable costs of the system. Monthly user charges have several components including a customer service charge, a base charge for sewer service, water and sewer use charges, and a TBW pass-through charge which is calculated annually to recover the cost of purchased water. The rate structure is considered strong.

water use in 2012. Rates are manageable and competitive relative to nearby systems, and at 1.8% of median household income, rates remain under Fitch's affordability threshold (2%). The county implemented an annual rate adjustment indexed to inflation. Rate increases beyond the annual inflation adjustment are not expected, which should leave rates affordable over the intermediate term.

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Additional information is available at 'www.fitchratings.com'. The ratings above were solicited by, or on behalf of, the issuer, and therefore, Fitch has been compensated for the provision of the ratings.

In addition to the sources of information identified in Fitch's U.S. Municipal Revenue-Supported Rating Criteria, this action was additionally informed by information from Creditscope.

Applicable Criteria and Related Research:

- 'Revenue-Supported Rating Criteria' (June 12, 2012);
- 'U.S. Water and Sewer Revenue Bond Rating Criteria' (Aug. 3, 2012);
- '2012 Water and Sewer Medians' (Dec. 8, 2011);
- '2012 Sector Outlook: Water and Sewer' (Dec. 8, 2011).

For information on Build America Bonds, visit www.fitchratings.com/BABs.

Applicable Criteria and Related Research:

Revenue-Supported Rating Criteria
http://www.fitchratings.com/creditdesk/reports/report_frame.cfm?rpt_id=681015
U.S. Water and Sewer Revenue Bond Rating Criteria
http://www.fitchratings.com/creditdesk/reports/report_frame.cfm?rpt_id=684901
2012 Water and Sewer Medians
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APPENDIX D

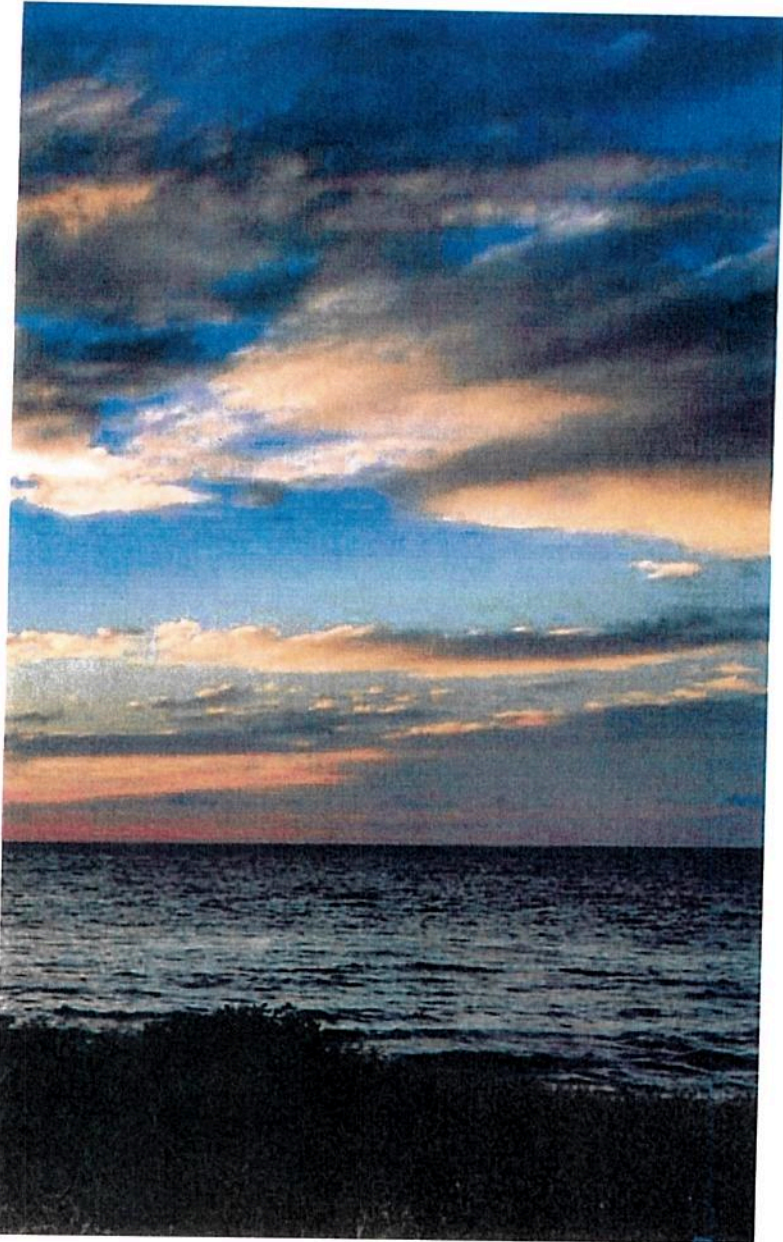
RECHARGING COASTAL AQUIFERS WITH RECLAIMED WATER



Recharging coastal aquifers with reclaimed water

The Hillsborough County Public Utilities Department recharges a stressed coastal saline aquifer with reclaimed water to help recover depleted water levels and guard against saltwater intrusion

Harold E. Schmidt Jr., Michael Weatherby, Philip Waller, Bart Weiss, and James Duncan



Hillsborough County Public Utilities Department, a regional leader in Florida water reclamation and water resources protection, has a goal to achieve 100% reuse within its service areas. To meet this goal, the county is evaluating the direct recharge of reclaimed water from its south service area into a highly mineralized portion of the Upper Floridan Aquifer – more than 10,000 mg/L total dissolved solids (TDS). With seven water resource recovery facilities (WRRFs), the county at times has more reclaimed water supply than demand and was seeking a feasible beneficial reuse alternative to surface water disposal.

The county's reclaimed water undergoes advanced wastewater treatment, including nitrogen and phosphorus removal, and high-level disinfection. These standards must be met because a portion of the reclaimed water discharges through permitted surface water outfalls to Tampa Bay and associated tributaries. Since the county produces reclaimed water continuously and the reclaimed water is an on-demand system, this disposal typically occurs when the supply exceeds demand and the county's storage tanks are full.

The WRRFs have a total reclaimed water production capacity

of 136,274 m³/d (36 mgd). Of this total, approximately 60%, or 83,279 m³/d (22 mgd), is reused by industry and landscape irrigation (for example, residential and commercial landscapes, green space areas, and golf courses). The Northwest reclaimed water use is mostly irrigation for residential customers and golf courses, while the South-Central area use is primarily large industrial users, golf courses and a growing number of residential customers.

Partnering for resources

The Southwest Florida Water Management District (SWFWMD) in 2008 determined that using reclaimed water could help replenish water levels in stressed portions of the aquifer. The utility providing the reclaimed water could receive groundwater mitigation offset credits to be used for future groundwater withdrawal in the Southern Water Use Caution Area (SWUCA), where water use permits would not otherwise be obtainable. The SWFWMD is considering allocating up to 90% of the recharged amount as mitigation offset credits to the county.

A Hillsborough county study supported the use of direct aquifer recharge at the coastal location of a former aquifer storage and recovery (ASR) project at the former Big Bend Dechlorination Facility. After contracting with a consulting firm, the county initiated the \$3 million South Hillsborough Area Recharge Project (SHARP). The project is focused on recharging a deep saltwater-impacted aquifer between Tampa Bay and inland sources of fresh groundwater. The objective is to prevent or reduce lateral saltwater intrusion, which has resulted from over-pumping coastal fresh groundwater. This hydraulic mound should allow the groundwater level to recover inland, reversing the hydraulic gradient to the Gulf of Mexico. The SHARP project is a small component of the county's Coastal Environmental Protection Program that may be expanded along the western coastline. In the county's South Central facility reclaimed water service area, approximately 45,461 m³/d (10 mgd) of seasonally available reclaimed water is available for this program.

The SHARP pilot project location matches the preferred coastal aquifer recharge system alignment identified by the 2008 SWFWMD reclaimed water aquifer recharge feasibility study. The pilot aquifer recharge site is near existing reclaimed water surface water disposal infrastructure, making it a more cost-effective project (see Figure 1, p. 48).

The construction team drilled a new recharge well and a new monitoring well approximately 335.3 m (1,100 ft) deep into the dolomitic limestone Avon Park Formation (see Figure 2, p. 48). Lateral saltwater intrusion has affected this formation, which has a TDS concentration similar to seawater (approximately 35,000 mg/L). Waters with TDS concentrations less than 10,000 mg/L are considered Underground Sources of Drinking Water and are protected by the U.S. Environmental Protection Agency (EPA). Based on previous numeric groundwater modeling results, the recharge well is expected to have an annual recharge rate of 9092 m³/d (2 mgd) for the pilot system and provide up to 2.76 million m³ (730 million gal) of recharge per year to the Upper Floridan Aquifer.

Construction of the pilot well system is expected to be complete in the Spring 2014. Existing wells at the pilot recharge

Figure 1. Proposed South Hillsborough Area Recharge Project site



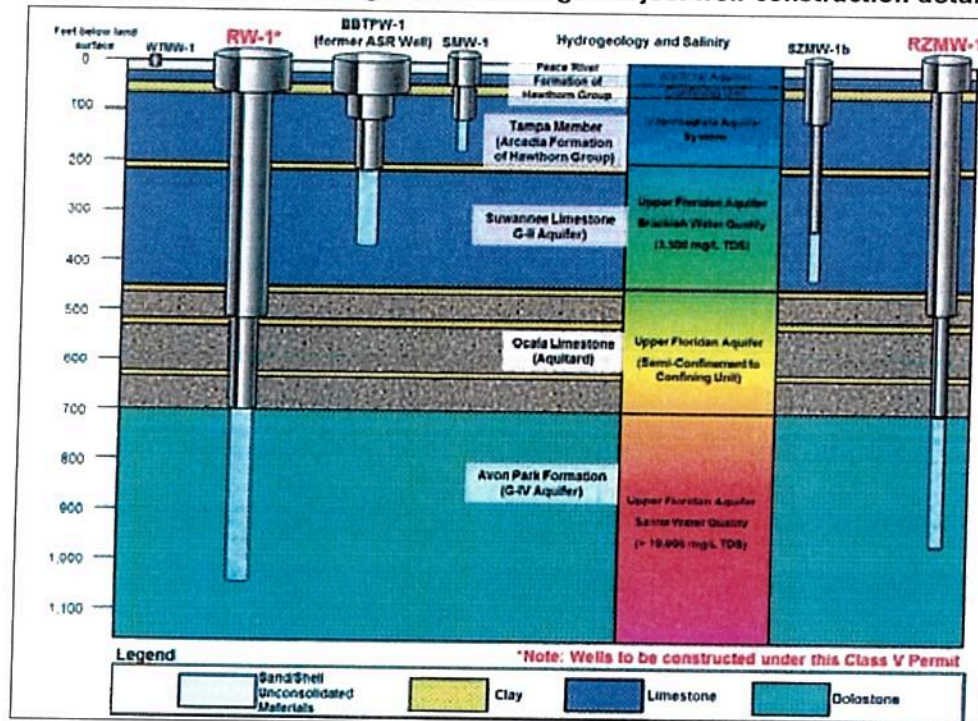
site, initially constructed for the previous ASR well system, will be used as local monitoring wells. The county will seek permission from the Florida Department of Environmental Protection (FDEP) to start recharge activities following construction. The project team will observe and document water level and water quality changes during the multiyear pilot testing program. They will use groundwater modeling to simulate observed data and extrapolate potential water level and water quality changes into the future. From this numerically modeled groundwater data, a full-scale, multiple-well system can be simulated to provide an approximate hydrogeological response of a regional aquifer recharge system.

Extrapolating the future

Because the outcome of the study could prove beneficial to other regions of the state, FDEP and SWFWMD are partnering with the county. FDEP has coordinated with the county on permitting the Class V Group 2 recharge well. SWFWMD is providing cooperative funding up to 50% of SHARP as well as assisting with project development and construction. The benefits of SHARP include environmental restoration and protection of Tampa Bay and coastal aquifers, reclaimed water system flexibility, and future groundwater resource development in areas where it is currently restricted.

According to the SWFWMD's SWUCA recovery strategy, additional groundwater cannot be developed in the SWUCA unless its

Figure 2. South Hillsborough Area Recharge Project well-construction details



development provides a net benefit to the Most Impacted Area (MIA) of the SWUCA. The MIA covers coastal areas of central Florida counties that exhibit the highest historical decline in water levels. The recovery strategy also calls for the use of alternative water sources prior to developing additional fresh groundwater, but this restriction has left several inland rural public and private utilities without options to meet future demands because surface water, brackish water, or significant reclaimed water and conveyance infrastructure may be unavailable.

Aquifer recharge using reclaimed water at the SHARP site will improve groundwater levels in the MIA of the



SWUCA (see Figure 3, right).

Significant regional water level improvements are related directly to the recovery or mounding effects from a recharge system, which depends on the size of the recharge system and the amount of water recharged. Once demonstrated, additional groundwater withdrawals, which currently are not allowed, in eastern Hillsborough county and/or western Polk county may be realized. While up to 90% of the water level improvements may be utilized by new groundwater withdrawals, these must still meet current SWFWMD rules for water use permitting. The recharging utility may earn mitigation offset credits from SWFWMD as long as 10% of the water level improvement remains as a net benefit to the local groundwater resource within the MIA.

If the pilot system is deemed a success, the county is planning to construct and operate a 45,461 m³/d (10 mgd) recharge system based on its projected 2025 excess reclaimed water flows. An aquifer recharge system of this size would provide significant improvements to the MIA of the SWUCA. If the county directs all excess reclaimed water to the recharge system then, at build-out of the urban service area, there would be approximately 102,206 m³/d (27 mgd) available for recharge. An alternative is a multipartner regional recharge system on the order of 113,562 m³/d (30 mgd), which could create potable groundwater credits to meet the regional water needs through year 2030 while providing numerous environmental improvements and benefits.

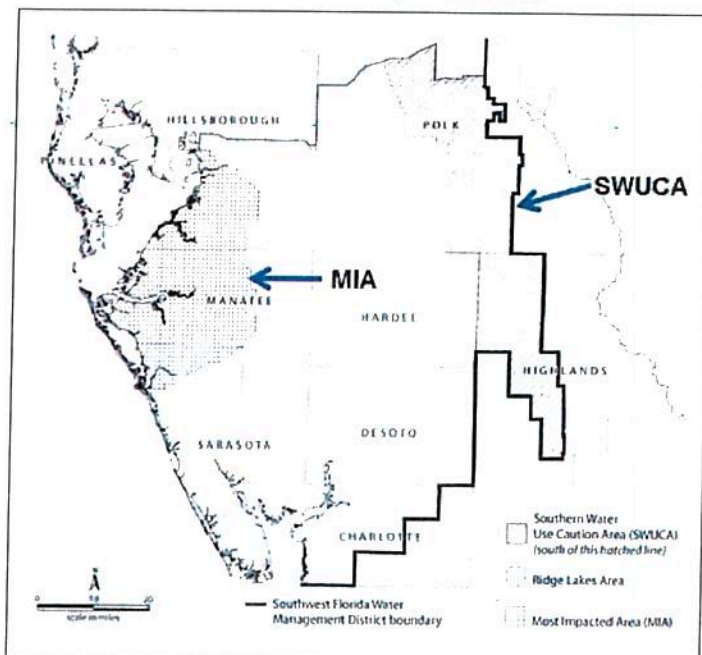
Ancillary benefits

The concept of reclaimed water aquifer recharge has many benefits to be realized by the county. Other applications of aquifer recharge in other areas may have different benefits, including a saltwater barrier, nutrient load reduction to Tampa Bay, and reclaimed water flexibility.

Coastal aquifer recharge at the county's Big Bend site will create a saltwater intrusion barrier system that parallels the coastline. This system will mitigate the advancement of saltwater intrusion into the Upper Floridan Aquifer, which threatens inland fresh groundwater supplies. This barrier should reestablish the groundwater gradient toward Tampa Bay and the Gulf of Mexico and protect this aquifer's water quality from salinity incursions in the future. A single well cannot be considered a salinity barrier. Only a multiple-well system can start to provide protections against salinity encroachment. The greater the number of wells, the better the protection and mitigation.

In June 2013, FDEP established numeric nutrient criteria for 22 estuary and coastal segments and has committed to adopting criteria for the remaining estuaries in 2015 after data collection and analysis and EPA approval. Because the proposed limits for estuaries and coastal waters may significantly limit the use of the county's surface water discharges in the future, the county realizes that aquifer recharge can provide a more beneficial reuse option to disposal of a high-quality water source. Developing enough new reclaimed water customers to achieve its 100% reuse goal is not possible before the numeric nutrient criteria rules are finalized. After 2015, the county's wet weather primary disposal option may be further limited. The aquifer recharge system will nearly eliminate

Figure 3. Boundaries of the southern water use caution area with the most impacted area



the use of the surface water discharge and provide an option for beneficially using the excess reclaimed water instead of disposal. An expanded aquifer recharge system that incorporates the county and possibly other local municipalities can reduce significantly the annual disposal of up to 227,305 m³/d (50 mgd) of domestic wastewater containing upward of 200 tons of nitrogen, into Tampa Bay.

During the dry months of the year, the county sends all of its reclaimed water from the three WRRFs in the southern service area to industrial and irrigation use. In areas where the irrigation water flow demands exceed the county's reclaimed water flows, the aquifer recharge system can provide additional groundwater to augment this seasonal reclaimed water need. Groundwater credits will enable the county to provide a higher reclaimed water system reliability to its irrigation customers by meeting peaks with groundwater wells strategically located in the system.

The SHARP pilot reclaimed water aquifer recharge system is poised to be a winning solution for the county, SWFWMD, and the state. Compared to other solutions identified to address Florida's environmental and water supply issues, coastal reclaimed water aquifer recharge is a very cost-effective method that can generate environmental enhancements and future water supply opportunities for coastal regions throughout the state.

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